Addressing Enterprise-Level Information System Deficiencies

THESIS
MARCH 2015

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AFIT-ENS-MS-15-M-111

DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY

AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

AFIT-ENS-MS-15-M-111

ADDRESSING ENTERPRISE-LEVEL INFORMATION SYSTEM DEFICIENCIES

THESIS

Presented to the Faculty

Department of Operational Sciences

Graduate School of Engineering and Management

Air Force Institute of Technology

Air University

Air Education and Training Command

In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Logistics and Supply Chain Management

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March 2015

AFIT-ENS-MS-15-M-111

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Abstract

The failure of the United States Air Force's (USAF) Expeditionary Combat Support System (ECSS) program has resulted in supply chain stakeholders creating independent solutions in a complex network of supply chain information systems (IS). The decentralized management of IS has led to stakeholders optimizing local missions to the detriment of enterprise level goals and effectiveness. This case study evaluates the Depot Source of Repair (DSOR) team and how it has addressed the USAF's enterprise-level IS deficiencies. A framework created from the literature review is used to evaluate the DSOR team's IS called DSOR II. The case study evaluation identified five key managerial implications which better addresses the negative impacts of USAF IS deficiencies. A more effective IS will help the DSOR team manage the USAF's $13 billion depot repair program more effectively. The framework introduced in this report can be used by organizations challenged with enterprise-level IS deficiencies.

To my father for giving me the limitless gift of opportunity
and to my wife for her support throughout the AFIT experience

Acknowledgments

I would like to express my gratitude to my advisers, Dr. Alan Johnson and Lt Col Matthew Douglas for their guidance and leadership. I would also like to thank my sponsors Mr. Eugene Jeunelot, Mr. Douglas Edmonds, and Mr. James Marsh of the Air Force Materiel Command (AFMC) for the research topic, their support and resources to complete this thesis.

Dipta Kazi

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List of Acronyms

A4	Logistics Directorate
AFIT	Air Force Institute of Technology
AFMC	Air Force Materiel Command
ALC	Air Logistics Center
CCD	CORE & Candidate
CITI	Collaborative Institutional Training Initiative
DAC	Depot Activation Cell
DMI	Depot Maintenance Inter-service
DoD	Department of Defense
DSOR II	Depot Source of Repair Sharepoint IS
ECSS	Expeditionary Combat Support System
ES-S	Enterprise Solution Supply
FOC	Fully Operational Capability
IOC	Initial Operational Capability
IS	Information System
LIMS-EV	Logistics, Installations, and Mission Support Enterprise-View
MRO	Maintenance, Repair and Overhaul
MS	Milestone
NSN	National Stock Number
PM	Program Manager
SIRS	Secondary Item Requirements System

SORA	Source of Repair Analysis
USA	United States Army
USAF	United States Air Force
USMC	United States Marine Corps
USN	United States Navy
WebFLIS	Web Federal Logistics Information Service

ADDRESSING ENTERPRISE-LEVEL
INFORMATION SYSTEM DEFICIENCIES

I. Introduction

This research examines the United States Air Force (USAF) management of its supply chain information system (IS) network. The USAF currently employs a decentralized approach to the management of its supply chain IS network. This section contains an introduction to the USAF supply IS network, problem statement, purpose and the assumptions of the research.

USAF Supply Chain IS Network

The USAF has been operating its supply chain using hundreds of independent and outdated software programs, commonly referred to as "legacy systems", to meet its mission requirements (Hamilton, 2007). The USAF determined this was not the optimal way to manage its supply chain capabilities and, in 2004, decided to follow in the footsteps of many successful private organizations in adopting an Enterprise Resource Planning (ERP) system to streamline its supply chain. The USAF initiated the acquisition and adoption of a system called the Expeditionary Combat Support System (ECSS).

ECSS was the USAF's solution to an outdated and sub-optimal supply chain IS. The ERP system was designed to streamline information across all key stakeholders in the supply chain, from the manufacturer to the maintenance, repair and overhaul (MRO) functions to the war-fighter (Hamilton, 2007). ECSS would eliminate the need for over 420 independent IS and be the focal point for order management, purchasing, inventory, distribution and financial information (Hamilton, 2007). The new IS would give decision makers real time visibility of

their assets and weapons system status, synchronize logistics planning and execution and, as a result, reduce the cost of global logistics operations (Hamilton, 2007).

The ECSS dream, however, was not to be realized in its current form as the program was cancelled in 2012. It was determined that an additional $1 billion would be required to realize only a quarter of the program objectives. The ECSS program failed because the USAF could not overcome cultural resistance among its personnel to change business processes, lacked program leadership, did not mitigate identified risks, and did not follow acquisition best practices (Levin & McCain, 2014). The program wasted eight years of forward progress in transforming an outdated supply chain, over $1.1 billion in government funds, and left the USAF with a similar inadequate logistics system ECSS promised to replace (Levin & McCain, 2014).

The cancellation of the ECSS program left USAF supply chain stakeholders with the challenge of managing hundreds of inter-connected and standalone information systems to accomplish their mission. The USAF supply chain is managed by a complex network of IS and employs a decentralized approach to managing its supply chain IS. The current supply chain network is a complex web of IS which operate both independently and in conjunction with others. To illustrate the complexity of the USAF supply chain IS, Figure 1 depicts just one of the over 420 IS interactions used to managed the supply chain. This diagram illustrates all the IS systems which feed into the Secondary Item Requirements System (D200A) and all the IS to which it sends information. The other IS depicted in the chart have similar information inflow and outflow charts. For example, the D035A is one of the systems which receives data from D200A and has 50 other IS with which it shares data (HQ AFMC/A4RM, 2014).

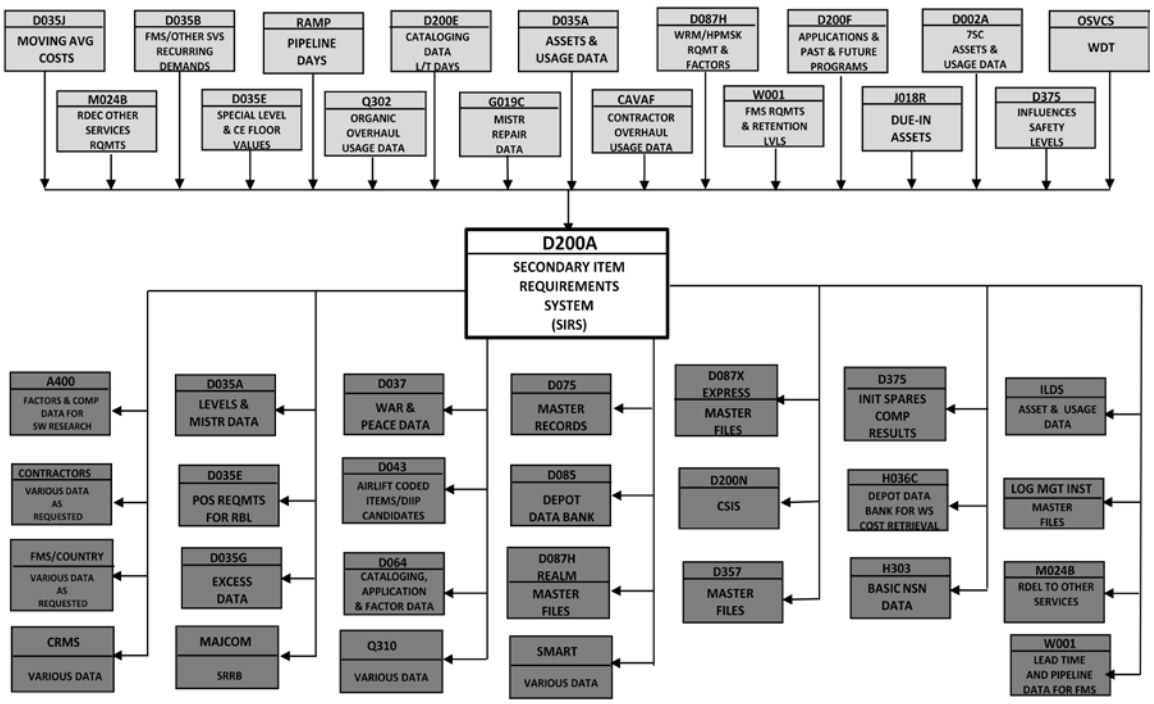


Figure 1: Example of USAF Supply Chain IS Complexity (D200 Program Office, 2013)

Supply chain stakeholders have created IS specifically to enable their mission, which may or may not collaborate with other IS to manage information. IS that do not collaborate with other IS may contain outdated and unreliable information. The IS created by the individual stakeholders are mission specific and designed to optimize local objectives and missions. The objectives and missions of stakeholders often involve external organizations. The local IS solutions do not necessarily account for the objectives and mission of the external users. The local IS solution adds to the number of IS with which supply chain partners must interact. These issues add to the ineffective and inefficient nature of a decentralized IS approach.

Problem Statement

One of the benefits to this approach is that it would make it difficult for adversaries to disrupt the supply chain by attacking an organization's IS. A disruption to one system would not necessarily impact the entire supply chain since so many of the IS work independently. Another

benefit is that a stakeholder can customize the IS to satisfy particular needs or desires. This benefit can also be a negative if the stakeholder does not consider the needs of other supply chain partners. The ability to truly customize an IS to the mission requirements can be a benefit if the project team develops an effective IS. A third benefit is that a decentralized IS network is more easily attained since it delegates the responsibility of developing IS to stakeholders and sub-organizations. A centralized IS involving an ERP can sometimes be too big for organizations to develop and implement effectively at the enterprise level. The USAF's ECSS program is an example of a project that failed because it was too large and complex in scope.

There are many challenges with a decentralized approach to managing a supply chain IS network. This report focuses on the following problems which arise from the decentralized approach:

1. Decentralized IS management leads to stakeholders creating solutions which optimize local missions (hereafter referred to as "pocket optimization").
2. Pocket optimization results in sub-optimal IS solution for supply chain partners.
3. Sub-organizations' lack of strategic outlook, process knowledge, and resources lead to an expensive, inefficient and ineffective IS network.

The problem statement captures some of the negative impacts of enterprise-level IS deficiencies. There are many studies conducted to address the enterprise level issues. This research addresses the problems created by enterprise level deficiencies from a supply chain stakeholders' perspective.

Purpose

The purpose of this study is to address how supply chain stakeholders can mitigate the negative impacts of enterprise-level IS deficiencies. It does not attempt to solve the enterprise-

level issues but focuses on how stakeholders can best adapt to the enterprise's current IS environment. A decentralized IS approach has left it up to sub-organizations to develop, design and implement IS which will best enable their respective missions. Stakeholders have to use their resources to develop an IS which can neglect the larger organizational strategy and goals. This research will assist managers challenged with enterprise-level IS deficiencies to develop, design and implement an effective IS for his/her organization. The following research and investigative questions are used to guide the research:

Research Question:

How can organizations address negative impacts of enterprise-level Information System (IS) deficiencies?

Investigative Questions:

1. How does an organization evaluate and identify the requirements of an effective Information System (IS)?
2. How does an organization design an IS which best serves its intended function?
3. How does an organization adopt and implement its IS?

A literature review, which can be found in Chapter 2, is used to propose a framework for evaluating the IS challenges facing a USAF supply chain stakeholder. A case study method is then used to evaluate the framework. The research methodology and data collection sources are detailed in Chapter 3. The data collected in the case study are presented and analyzed in Chapter 4. Lastly, Chapter 5 contains recommendations to manage the stakeholder's business process and IS more effectively.

Assumptions

There were several assumptions which had to be made in performing this case study. The first assumption is that the USAF Depot Source of Repair (DSOR) process used for our case study is representative of IS issues affecting the USAF supply chain This case study does not attempt to address any non-IS issues within the USAF supply chain.

An assumption made in the framework developed from the literature review is that the organization is able to source the software engineering capability required to create an IS. This research does not focus on the technical aspect of software engineering but discusses the functions, features and qualities an effective IS should have. In order to field the designed IS, the organization must use its internal software engineering capabilities or partner with a contractor to design it for them.

The last assumption made in this case study is that the 43 NSNs used to compare the data quality across six IS is representative of the DSOR database. The 43 NSNs were selected from a diverse set of aircraft with varying missions and with different demand levels.

II. Literature Review

The literature review addresses the underlying problem by addressing three topics. The first topic is a literature review in business case design and strategic functions of IS development. The second topic is related to the general functions, features and qualities which are desirable in IS design. The third topic presents best practices for implementation and diffusion of IS in an organization. The literature review consisted of 48 academic sources, which contributed to a framework presented at the end of this chapter.

Business Case Analysis

A literature review of IS, management and other academic journals revealed there are some common approaches to establishing a business case for an IS project. Most of these business case approaches involve strategic level planning and leadership involvement. A table of sources and the common themes found in the literature review is provided in Table 1.

Table 1: Business Case Literature Review Findings

Source	Gain leadership support at appropriate level	Business Process Reengineering	reqmts / objectives (business case)	Evaluate organization's resource availability	Evaluate organizational knowledge capabilities	Align organization & IS strategies
Aladwani, 2001	x				x	
Bingi, Sharma, & Godla, 2006	x	x	x	x		x
Bostrom & Heinen, 1977		x	x		x	
Bostrom & Heinen, 1977	x	x	x		x	x
DeLone & McLean, 2003			x			x
Dorling, 1993	x		x		x	x
Ein-Dor & Segev, 1978			x		x	x

Garg, Goyal, & Lather, 2010	x		x		x	x
Ghobakhloo, Hong, Sabouri, & Zulkifli, 2012	x		x	x	x	x
Hamilton, 2007	x					
Hazen & Sankar, 2015						
Holland & Light, 1999	x	x	x		x	x
Jukic, Jukic, & Velasco, 2009		x				x
Kholeif, Abdel-Kader, & Sherer, 2007	x	x				
King, 1978			x			x
King, 2013	x					
Kottemann & Konsynski, 1984			x	x		x
Kumar, Maheshwari, & Kumar, 2002	x	x	x		x	x
Lambert, 2014		x			x	x
Lee, Lee, & Lin, 2007					x	
Levin & McCain, 2014	x	x	x			
Markus, 1983		x	x		x	
Mohan & Ahlemann, 2013					x	
Nah, Zuckweiler, & Lau, 2003	x	x	x			x
Saeed & Abdinnour, 2013					x	
Saeed & Abdinnour-Helm, 2008	x				x	
Schmitt & Kozar, 1978	x		x			
Segars, 1998		x	x		x	x
Soh, Kien, & Tay-Yap, 2000					x	
Subramanian, Klein, Jiang, & Chan, 2009	x	x		x	x	
Wilkin & Cerpa, 2012	x		x			x
Wilkin & Davern, 2012					x	
Williams & Beatty, 2006			x	x	x	x
Zollar, 1999	x				x	
Zoughbi, 2013						x

These common findings were captured in the sections below. They contribute to the business case development stage of the conceptual framework.

Align organizational and IS strategies

The literature review revealed that the alignment of the organization's strategic goal and IS strategic goal is a critical part of a successful IS project. Misalignment of these two goals is a

significant contributor to why over 70% of IS related projects fail (Garg, Goyal, & Lather, 2010). Most IS projects that do not contribute to the organization's strategic goals become obsolete, ineffective or lead to user dissatisfaction (Garg, Goyal, & Lather, 2010).

A system cannot be successful by its features and functionality alone; it must contribute to a strategic goal as determined by the organization. Managers must refrain from the tendency to develop IS in terms of the cost savings but instead focus on the business benefits that can be gained from the new features and functions (Williams & Beatty, 2006). Managers have a tendency to tackle IS projects without analyzing the organization's processes and how those processes support organizational strategy, a misstep which leads to post deployment problems (Jukic, Jukic, & Velasco, 2009).

A framework presented by William King is a good example of how to effectively align organizational and IS goals. This is a critical step in the business case development because the IS strategy is the first crucial step for system development (King, 1978). In his framework, King takes into consideration all of the organization's stakeholders in establishing the organizational strategy set. These stakeholders include customers, stockholders, government, lenders, employees, management and the general public. The organizational strategy set is used to identify the IS strategy set, which include three key components. The system objective component is the purpose which the IS is to serve (e.g., "to permit the payment of 98% of invoices by the due date") (King, 1978). The constraint component involves factors both internal (personnel, practices, resources) and external (government, industry practices, inter-organizational collaboration) which hinder the organization's ability to carry out the system objectives (King, 1978). The strategy component helps guide the IS design effort. In this step, it is important to decide how the IS will be designed, by whom, using which resources and within

what timeline. An important decision factor at this stage is determining whether the organization has the technological capability to design and program the IS organically or if they must outsource to a private software development firm. Determining this early on will help with the IS design planning in the next step of IS development. An example of organizational and IS strategic goals are provided in Appendix 1.

Once the organizational strategy set has been determined, analysts familiar with the available system alternatives, configurations and attributes transform the organizational strategy into IS strategy set (King, 1978). It is important that these analysts stay in constant communication with management and solicit their feedback.

Enlist support at appropriate level

An important step early in the project development and strategic planning stage is to get the involvement and support of a powerful champion with funding authority (Schmitt & Kozar, 1978). Generally, the type of power and authority necessary for the implementation of an IS project resides with the top management of an organization.

The support of top management or someone with the appropriate authority and influence is critical to the development and deployment of an IS project. Top management is more likely to link the organizational and IS strategies together to get the most out of the organization's investment. They are also more readily able to secure the funding required to implement the IT project (Schmitt & Kozar, 1978). A leader in a position of authority can also direct the involvement and cooperation of any sub-organization to collaborate on the development and implementation of an IS. Having someone with this type of authority can be beneficial to developing a truly effective IS.

Having the support of a leader at the appropriate level also ensures there are benefits to be realized by all sub-organizations involved in the project. This is a key aspect to addressing the enterprise-level IS deficiencies. In a decentralized IS network, organizations tend to develop IS which help their local mission. The issue is that their mission involves other stakeholders which do not realize the same IS benefits. If external organizations are required to adopt an IS which they do not benefit from, they will not be motivated to help the IS be implemented and used properly (Hazen, 2012). Support at the proper level ensures that new IS innovations are developed to truly benefit all the organizations involved and not just one sub-organization.

Evaluate organizational capabilities

Any time an organization is making a large investment in a project, it is important to evaluate whether it is able to execute the project as intended. There are multiple factors which go into determining whether an organization is able to adequately execute the project. To determine which factors are critical to determining an organization's IS capability; factors from three existing theories are listed in Table 2. These combined factors are divided into three categories; factors that are within the organization's control, factors that can be partially controlled by the organization and factors over which the organization has no control (Ein-Dor & Segev, 1978).

Table 2: Organizational Factors in IS Adoption

Factor	Source
Uncontrollable factors	
Organizational size	Ein-Dor & Segev, 1978
Organizational structure	Ein-Dor & Segev, 1978
Organizational time frame	Ein-Dor & Segev, 1978
Extra-organizational situation	Ein-Dor & Segev, 1978
IT products in market	Ghobakhloo, Hong, Sabouri, & Zulkifli, 2012
External expertise & service availability & support	Ghobakhloo, Hong, Sabouri, & Zulkifli, 2012

Process compatibility	Ghobakhloo, Hong, Sabouri, & Zulkifli, 2012
Partially controllable factors	
Firm's resources	Ghobakhloo, Hong, Sabouri, & Zulkifli, 2012
Financial resource availability	Ghobakhloo, Hong, Sabouri, & Zulkifli, 2012
Organization's technical expertise	Lee, Lee, & Lin, 2007
Knowledge acquisition/application/sharing	Lee, Lee, & Lin, 2007
CEO's support and commitment	Ein-Dor & Segev, 1978
Organizational maturity	Ein-Dor & Segev, 1978
Organizational climate	Ein-Dor & Segev, 1978
Fully controllable factors	
Training availability	Lee, Lee, & Lin, 2007
Steering committee	Ein-Dor & Segev, 1978
Users' participation and involvement	Ghobakhloo, Hong, Sabouri, & Zulkifli, 2012
Organizational culture	Ghobakhloo, Hong, Sabouri, & Zulkifli, 2012
Integration of internal processes	Ghobakhloo, Hong, Sabouri, & Zulkifli, 2012

Ein-Dor and Segev propose steps to determine whether the uncontrollable and partially controllable factors are too significant to overcome. The first step is to analyze the uncontrollable factors to determine if those factors are hostile or can be managed. If there are no solutions to addressing the challenges posed by uncontrollable factors, the program should be abandoned. If there are ways to address those challenges, even partially, then the organization should adopt those measures. The next step is to analyze the partially controllable factors and determine if there can be sufficient changes made to address the impact of those factors. If there are no feasible modifications, the project must be abandoned. If there are possible modifications, then the organization may move on to initiating project development or changes (Ein-Dor & Segev, 1978).

Map Information Flow

This step is critical to understanding how the IS must be set up to meet the business process or how the business process must be amended to align with IS capabilities. Information flow mapping is determining how the information will be transferred in, what the outputs are and the stakeholders involved (Lambert, 2014). The following steps can be taken to determine the information flow within the organization (Lambert, 2014):

1. Determine data requirements
2. Determine sources of data
3. Determine how output/information will be shared
4. Consider how inputs and outputs can be used to shape IS and organizational strategy

The information flow map must involve all applicable stakeholders, both internal and external to the organization. One of the most challenging factors will be the use of technology and integrating the data flow with other members of the supply chain to facilitate the business process (Lambert, 2014). These requirements touch on the topic of interoperability, which will be discussed in the next section.

Mapping the information flow will help identify the gap between the organization's information processing needs and its capabilities. One of the goals in the IS design must be to close the gap between organization's information processing needs and its capabilities in order to successfully develop and implement an IS (Hazen & Sankar, 2015).

Determine Business Process Reengineering (BPR) Feasibility

Multiple sources discussed the importance of configuring the business process with the software used as a support tool for executing the process. The IS being evaluated needs to be properly aligned with the process in which the organization executes its tasks and objectives

(Holland & Light, 1999). For example, once the customer places an order with the cashier at a fast food restaurant, the order needs to be relayed to the cook. The IS should be aligned with this process such that the cashier inputs the order and the information is transmitted to the cook. The process of aligning the software functions and the business process is called business process reengineering (BPR). This process is summarized in a 4-step model in Figure 2.

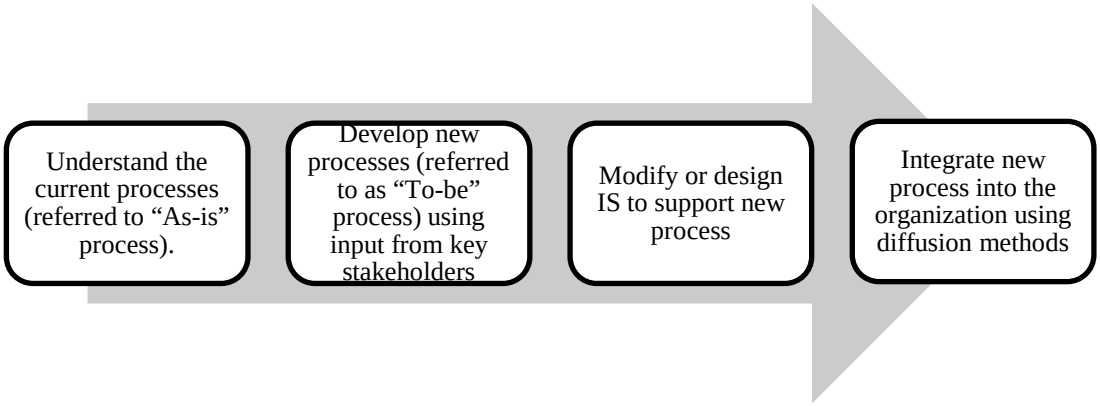


Figure 2: Model for BPR (Levin & McCain, 2014)

Most of the research found in the literature review recommends the BPR step be analyzed in the software development stage. Understanding the feasibility of the necessary Business Process Reengineering at an earlier stage will improve the IS project outcomes (Levin & McCain, 2014). The decision makers can determine early on whether the organization will be capable of aligning its process and software to attain the desired objectives of the project. It will save a significant investment in time and money if the organization is unable to reengineer its processes and software (Levin & McCain, 2014).

IS Design Evaluation

A content analysis in the literature review revealed some common approaches to IS design. There are certain functions and capabilities that are critical to the successful

development and implementation of any IS. Most of these recommendations are categorized under the umbrella of "software engineering practices". A table of sources and the themes found in the literature review can be found in Table 3.

Table 3: IS Design Content Analysis

Source	Capability to share data w/ supply chain stakeholders	Ensure data quality/accuracy and system functionality	Deliver organizational and user level implementation	Address end-user requirements	Employ external expert assistance if needed	Utilize cross-functional team	Adopt good project management practices	Ensure system modularity / interoperability	Employ socio-technical theory	Employ Software Engineering best practices
Aladwani, 2001	x	x	x	x		x				
Angulo, Nachtmann, & Waller, 2004	x									
Bingi, Sharma, & Godla, 2006	x	x		x	x	x	x		x	
Blankley, Khouja, & Wiggins, 2008	x									
Bostrom & Heinen, 1977		x						x	x	
Chalyvidis, Ogden, & Johnson, 2013	x							x		
DeLone & McLean, 2003	x	x		x				x		
Dorling, 1993			x	x	x	x	x			
Garg, Goyal, & Lather, 2010	x	x	x	x		x				x
Ghobakhloo, Hong, Sabouri, & Zulkifli, 2012				x	x					
Hazen & Sankar, 2015	x	x		x	x				x	
Holland & Light, 1999		x	x	x			x			
Jukic, Jukic, & Velasco, 2009			x					x		
Kholeif, Abdel-Kader, & Sherer, 2007						x				
King, 1978			x							

Kottemann & Konsynski, 1984		x	x	x				x		
Kumar, Maheshwari, & Kumar, 2002		x			x	x	x	x		x
Lambert, 2014	x		x					x	x	
Lane, 2009		x								
Lee, Lee, & Lin, 2007	x	x		x	x		x			
Markus, 1983	x	x	x	x		x		x		
Marques dos Santos & Reinhard, 2012								x		
Mohan & Ahlemann, 2013	x		x	x					x	
Nah, Zuckweiler, & Lau, 2003	x	x					x			x
Saeed & Abdinnour, 2013		x	x	x						
Saeed & Abdinnour-Helm, 2008	x	x	x	x				x		
Schmitt & Kozar, 1978		x			x					
Segars, 1998	x									
Soh, Kien, & Tay-Yap, 2000		x	x	x	x					
Subramanian, Klein, Jiang, & Chan, 2009		x	x	x			x			x
Wilkin & Cerpa, 2012						x				
Wilkin & Davern, 2012		x		x						
Williams & Beatty, 2006		x		x		x	x			
Xue, Zhang, Ling, & Zhao, 2013								x		
Zollar, 1999							x		x	

Adopt good project management practices

Successful IS projects need "managers to develop project management practices that are successful in a global, integrated and highly distributed computing environment (Garg, Goyal, & Lather, 2010: 278)." It is important for managers to maintain roles and responsibilities, and avoid scope deviations, schedule slippage, and cost overruns but they must ensure these requirements do not hinder capturing the organization's best practices from lessons learned in previous projects (Subramanian, Klein, Jiang, & Chan, 2009).

Figure 3 visually depicts recommended IS project management practices found in the literature review. Good project management practices can be summarized in 4 steps; structure the project, set objectives (milestones), gain commitment, and manage the project (McManus, 2014). The project must have a strong project manager with process knowledge and commercial skills. He/she needs to form a high performing implementation team and employ proven procedures and practices. Any tool(s) used in managing a project must easily populate information, and provide accurate, complete and timely data for effective decision making.

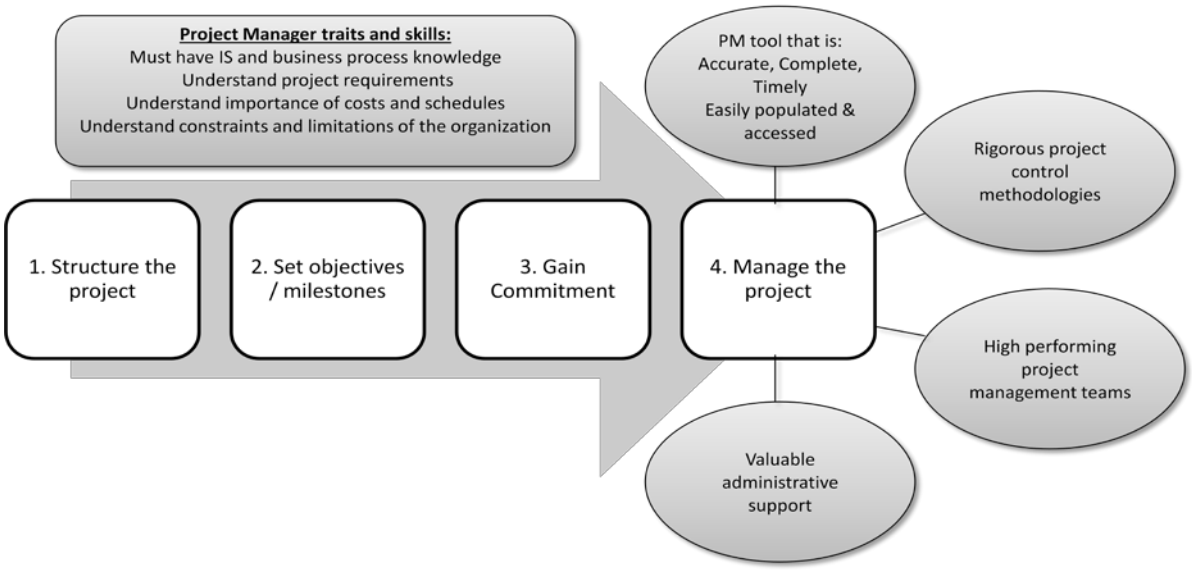


Figure 3: Model for IS Project Management Practices (McManus, 2014)

Software Design, function or quality

Most of the findings in the IS design content analysis may be categorized under the title "software design, function or quality." Sub-organizations must focus on achieving these outcomes in their IS design. These features, functions, and qualities are critical to the successful diffusion of the IS because it impacts the functionality and the perceived usefulness to the user. The software design functions, features and qualities are summarized in Table 4.

Table 4: Software Design Function, Feature and Quality Best Practices

Software Design Function, Feature, or Quality	Source
Data Quality	Lane, 2009
Interoperability	Chalyvidis, Ogden, & Johnson, 2013
Systems Quality	DeLone & McLean, 2003
End user requirements	DeLone & McLean, 2003

Data Quality. Any data contained within an IS must be accurate and reliable. This means it needs to be from a trusted source, up to date and correct. The data residing within an IS must be complete, easy to understand, personalized, relevant, and secure (DeLone & McLean, 2003). It is critical to any successful IS implementation as "it enhances system performance, builds trust in the system among users, and provides leadership with accurate information for better decision making (Lane, 2009: 56)."

Interoperability. It is critical for any organization which is part of a supply chain to embrace the concept of collaboration. Collaboration among stakeholders allow the supply chain to make changes in its decision making process and take actions which are beneficial to the overall supply chain (Chalyvidis, Ogden, & Johnson, 2013). In terms of IS, interoperability is the ability of two or more systems or elements to exchange information among them and to use the information that was exchanged (Marques dos Santos & Reinhard, 2012). It identifies the capacity of individual units to work together to accomplish useful functions. Some of the benefits of making an IS interoperable with other IS are increased effectiveness, efficiency, and responsiveness (Marques dos Santos & Reinhard, 2012).

System Quality. System quality refers to the usability, availability, reliability, adaptability, and response time (e.g., download time) of an IS (DeLone & McLean, 2003). The commonality among these traits is that they add value to the user and impacts the user's perception of the IS usefulness. This means the software used to create the IS must be on equal footing with the latest technology in order for it to be compatible with other systems (DeLone & McLean, 2003). Quality software enhances the user experience through its friendly interface and reliability. Users should not have to struggle to comprehend the simplest tasks or wait an extended amount of time for the program to load.

End-user requirement. The IS must deliver what the end user needs. This includes customer support and social system goals. The customer support aspect of this requirement refers to the overall support delivered to the user by the organization. This service can be delivered by the IS department, a new organizational unit, or outside contractor. Providing adequate customer support is extremely important since the users are now our customers. Poor user support will translate into low usage or IS failure (DeLone & McLean, 2003). The socio-technical theory attempts to increase usage rates and IS usefulness by increasing amount of feedback received, facilitate intra-organizational communication, and give more control to end users to help them take ownership of the tasks (Bostrom & Heinen, 1977). It also helps users actively engage in providing feedback and finding new and innovative uses.

These software development functions, features and qualities are critical in determining how useful the IS will be to the organization. These functions take into factor both technical and social aspects of technology development. The usefulness of the IS is directly related to it being used as intended. If the organization aligns its organizational goals with IS goals, then the intended use of the IS will help it achieve its organizational goals (DeLone & McLean, 2003).

The relationship between software design functions, features and qualities and the IS strategy execution is summarized in Figure 4.

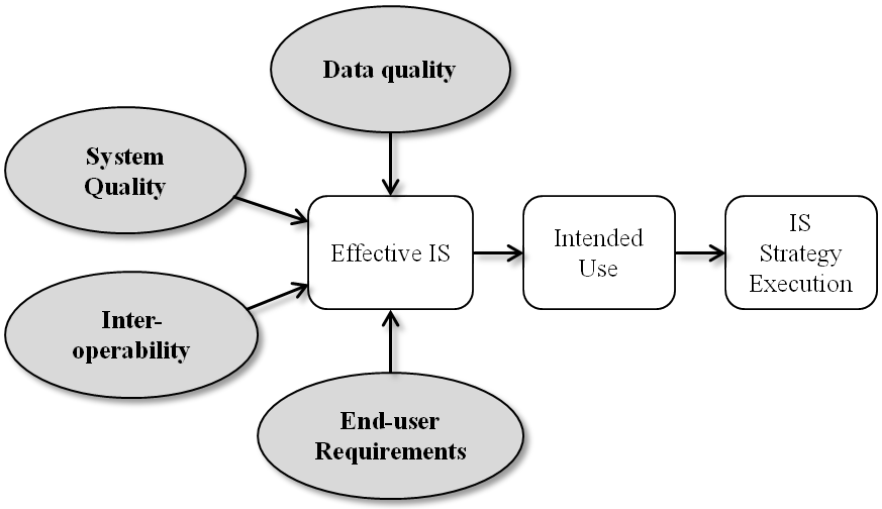


Figure 4: IS Design Functions, Features, & Qualities

Diffusion

The successful implementation of an IS is directly related to how well it is tied to the organization's strategy and design, both of which are explained in detail in the previous two stages (Hazen, Overstreet, & Cegielski, 2012). Once the IS strategy has been determined in the business case development stage and the IS is designed using the proposed model, there are post-adoption (referred to as "diffusion") steps that must be taken to ensure the IS is effectively diffused within the organization.

A content analysis of the literature review revealed several common theories and findings in existing research. A list of sources for the diffusion literature review is provided in Table 5. These findings are the basis for the diffusion part of our conceptual framework and are explained in greater detail in the following sections.

Table 5: Diffusion Content Analysis

Source	Influential leadership support	Communicate IS benefits with users	Adequate training / user support	Continuous Improvement / Feedback	Establish Formal Guidance
Kumar, Maheshwari, & Kumar, 2002	x	x	x	x	
Aladwani, 2001	x	x	x	x	
Bingi, Sharma, & Godla, 2006	x		x	x	
Bostrom & Heinen, 1977	x			x	
Dorling, 1993	x			x	
Garg, Goyal, & Lather, 2010	x				
Ghobakhloo, Hong, Sabouri, & Zulkifli, 2012	x		x		
Hamilton, 2007	x				
Hazen & Sankar, 2015			x	x	
Hazen, Hanna, & Hall, 2014					x
Hazen, Overstreet, & Cegielski, 2012	x		x		x
Holland & Light, 1999	x			x	
Kholeif, Abdel-Kader, & Sherer, 2007	x				
King, 1978				x	
King, 2013	x				
Lee, Lee, & Lin, 2007			x		
Levin & McCain, 2014	x				
Markus, 1983		x	x	x	x
Mohan & Ahlemann, 2013			x		
Nah, Zuckweiler, & Lau, 2003	x	x	x		
Saeed & Abdinnour, 2013			x		
Saeed & Abdinnour-Helm, 2008	x				
Schmitt & Kozar, 1978	x			x	
Subramanian, Klein, Jiang, & Chan, 2009	x		x		
Wilkin & Cerpa, 2012	x				
Wilkin & Davern, 2012			x		

Zollar, 1999	x			x	
Zoughbi, 2013				x	

Influential leadership support

This leadership support is different than the leadership support in the case development stage because it requires day-to-day involvement. In the case development stage, support from top management is required to get the project started. In this situation, the project requires someone who has enough influence in the organization but can also play a large role in the implementation of the project. The influential leader should be someone who can allocate and manage financial resources and has the power to gather support for the project (Zollar, 1999).

Ideally, this would be the project manager but it can be rare to find a project manager with so much power or influence. An influential manager is crucial in addressing user concerns and overcoming any resistance early in the diffusion stage (King, 2013). Simply communicating with users how the implemented IS will work and informing users of its benefits go a long way in addressing user concerns and getting their buy-in (Aladwani, 2001). The project leaders must be the biggest advocate for the IS and have good project management skills and tools to field an effective IS.

Establish Formal Guidance

This step refers to the "degree to which formal regulations and governing ordinance are established and updated to account for the innovation (Hazen, Overstreet, & Cegielski, 2012: 126)." After the IS is developed and ready to be implemented, the organization must formalize the IS by establishing official guidance which dictates its use, capability and/or requirements. This guidance can come in the form of user manuals, instructional guidance, process integration, or other official channels (Hazen, Overstreet, & Cegielski, 2012). This guidance validates the

importance of the IS to the organization and provides users with instructions for how the IS must be utilized.

Provide adequate training / user support

This step refers to the "degree to which the organization offers opportunities for initial and/or recurring training regarding the innovation (Hazen, Overstreet, & Cegielski, 2012: 126)." In a study of 820 IS executives, the availability of training was found to be positively associated with the successful implementation of IS (Lee, Lee, & Lin, 2007). Training users to use the IS is directly related to how successfully the IS will be incorporated (Hazen, Hanna, & Hall, 2014). Training must be effective enough for users to use and understand the IS effectively and accomplish their role in the business process. The cross-functional project team should be afforded an opportunity to develop the training plan as it will be able to provide input from the perspective of each stakeholder.

Implement Continuous Improvement / Feedback Methods

Once the system is designed and implemented, it must be monitored to ensure it is effectively meeting its goals (Bostrom & Heinen, 1977). If the IS goals are not being met, changes must be made. Continuous improvement is an iterative process which must take into account user feedback. User feedback is crucial in being able to make adjustments on the basis of socio-technical theory, which focuses on the user's perception of the IS (Bostrom & Heinen, 1977). The continuous improvement efforts will be made more effective with input from users, which is why implementing an effective user feedback method is crucial.

Framework

The literature review is intended to identify existing research and theories on IS strategy, design and diffusion. Its purpose is to offer a solution to minimizing the challenge of working in

an enterprise which employs a decentralized IS approach. The findings in the literature review can be summarized in the model developed in Figure 5.

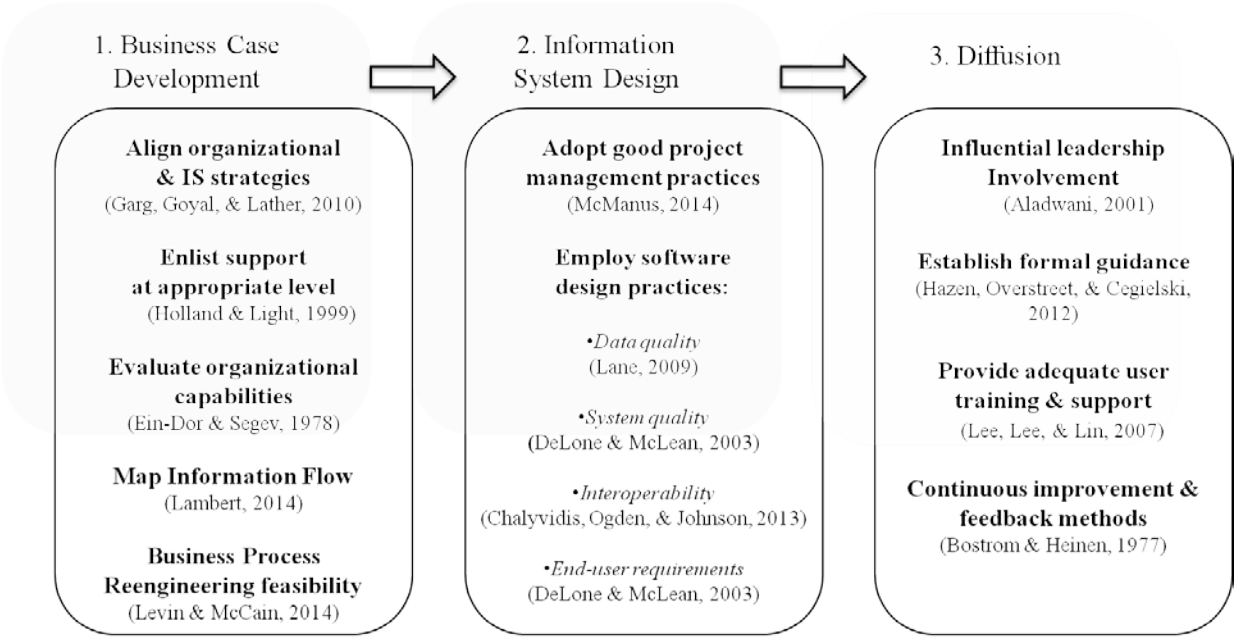


Figure 5: IS Development Framework

III. Methodology

This section of the report introduces the case study subject, the data collection methods used in the case study, and the various sources of information reviewed. The case study subject for the current study is the Depot Source of Repair (DSOR) team. It is part of the Logistics Directorate (A4) of the Air Force Materiel Command (AFMC) Headquarters staff. The study took place between January 2014 and January 2015. The data collection methods and sources of information are detailed in this chapter. The following section introduces the DSOR team and its role within the Department of Defense and the USAF.

Case Study Subject

The Department of Defense (DoD) has a process for developing and acquiring weapons and other systems called the Defense Acquisition System. It is divided into three milestones (MS). MS A initiates technology maturation and risk reduction, MS B focuses on engineering and manufacturing development and MS C executes production and deployment of the weapon system (Schwartz, 2014). The Initial Operating Capability (IOC) is attained when a sufficient amount of systems are delivered to the USAF to begin operations and Full Operational Capability (FOC) is achieved when the system has reached complete operational capability (Schwartz, 2014). The USAF uses the DoD acquisition process in its acquisition of weapon systems. Any reference to the DoD Acquisition process will be made using the term "USAF acquisition process". It is important to make this distinction because the DSOR team executes its mission for the USAF alone. A visual depiction of the entire USAF Acquisition System is shown in Appendix 2 to show its complexity (Defense Acquisition Unversity, 2010). A simplified process map of the USAF acquisition process and how the DSOR process fits within it is provided in Figure 6. The DSOR process executed by the DSOR team is one of many sub-

processes of the USAF acquisition system. This case study does not focus in depth on the entire acquisition process but on the DSOR team's involvement within it.

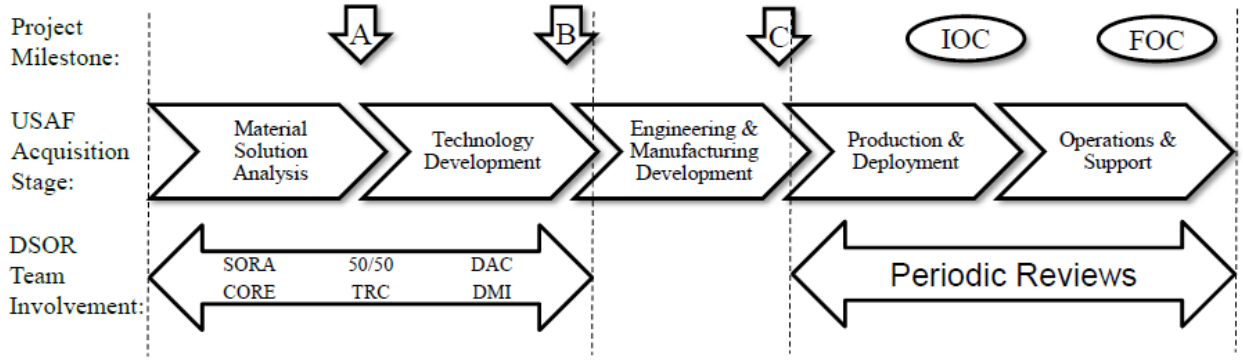


Figure 6: USAF Acquisition Process (AFMC/A4DC, 2014)

The DSOR team manages a process in which the USAF postures its depot level maintenance workloads (AF/AQXA, 2013). Depot maintenance is defined as "…any action performed on materiel or software in the conduct of inspection, repair, overhaul, or the modification or rebuild of end-items, assemblies, subassemblies and parts… (AFMC/A4DC, 2014: 21)." Any hardware, software, new acquisitions, and fielded systems managed by the USAF or its private contractor are required to have an organic or contracted depot maintenance capability. The DSOR process is in place to identify the depot or contract where the repair capability needs to be established (AF/AQXA, 2013).

The DSOR team works with similar sub-organizations in the Navy, Army and Marine Corp to identify the best source of repair for its systems and subsystems. Together, these sub-organizations determine how to best use the repair capabilities and resources in all of the DoD. The DoD was budgeted to spend nearly $30 billion on its military repair program in 2014. A breakdown of the fiscal year 2014 (FY14) budget by each branch is depicted in Figure 7 (Office of the Secretary of Defense, 2013).

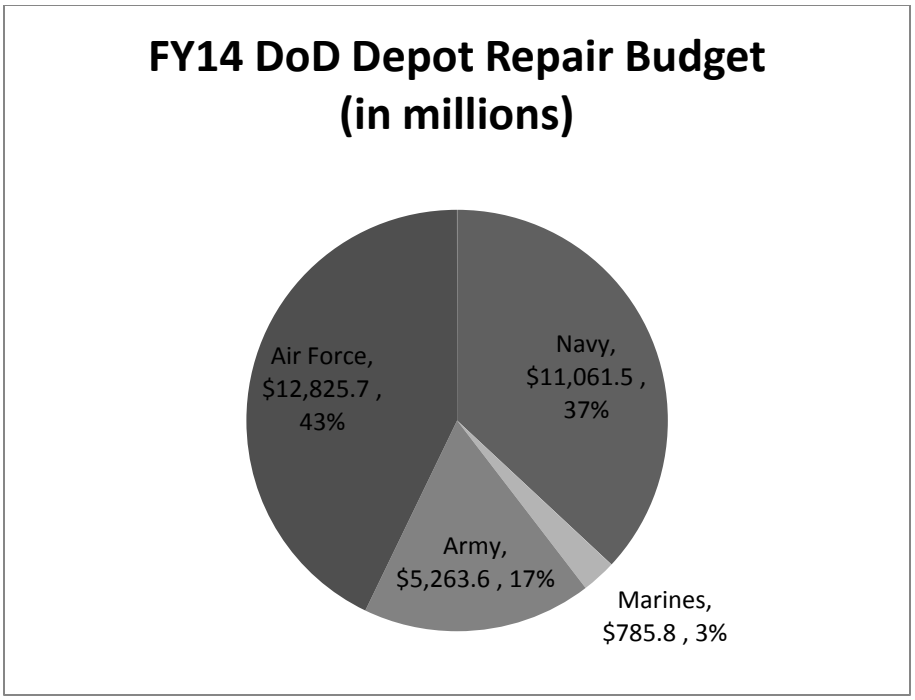


Figure 7: DoD FY14 Projected Depot Repair Budget

The DSOR team is in charge of posturing USAF repair capabilities across its organic repair depots or private industry partners (via contract). It is also the organization with primary responsibility for depot maintenance activation policy (AF/AQXA, 2013). This team plays a critical role in managing and executing the USAF's nearly $13 billion depot repair program. The repair capabilities are categorized into functional entities to accomplish depot level maintenance on a specific group of items called Technology Repair Centers (TRC). There are 24 TRCs in the USAF which reside within three USAF depots (hereafter referred to as Air Logistics Complex (ALC)): Oklahoma City ALC in Oklahoma, Ogden ALC in Utah, and Warner Robins ALC in Georgia (AFMC/A4DC, 2014). A breakdown of each TRC and the depot in which that function is maintained is listed in Appendix 3.

The DSOR team is divided into four sections; Source of Repair Analysis (SORA) team, CORE and Candidate Depot (CCD) team, the Depot Maintenance Inter-service (DMI) team and the Depot Activation Cell (DAC).

The DSOR team's primary function is approving the depot in which weapons systems and subsystems may be repaired. This process begins with the Program Manager (PM) submitting an approval request to the SORA section. The SORA section validates the information and begins coordination with the CCD section. The CCD section helps identify and validate the candidate depot for the DSOR request and determines whether the request is in compliance with congressional regulations specific to military maintenance. The DSOR request is then moved to the DMI section to obtain concurrence on the candidate depot from other services. The DSOR request is then approved by the AFMC/A4 Director and returned to the PM to continue the acquisition process. The DAC continues to work with PMs to provide support in case the requirements change and the candidate depot needs to be re-evaluated. The DAC also performs 3-year reviews on approved DSOR requests to ensure the requirements have not changed and the maintenance is being conducted at the appropriate depot or with the correct contract.

The DSOR team uses the DSOR II IS as a database, reports, and workflow process tool to accomplish its mission. It is a standalone system and does not automatically share or update information with any other IS or database. All information contained within DSOR II is created and maintained by its users. Its primary users are members of the AFMC/A4 DSOR team and PMs who need a DSOR request approved or validated during a 3-year periodic review.

This research was conducted using a case study approach. This chapter details why the case study approach was the best research method for the problem being addressed and the steps that were taken to conduct the research.

A case study is used to conduct an investigation into a real-world issue whose boundaries may not be easily identified (Yin, 2009). The problem to be investigated may have more variables than quantitative data points and those variables may come from multiple sources of evidence (Yin, 2009). In a case study, previously conducted research and developed theory may be used to guide data collection and analysis.

The case study method is the most appropriate research method for the underlying problem identified in Chapter 1. There are existing theories and research available to address the underlying problem. Those existing theories were used to evaluate the data collected from the case study. The case study was conducted using a research model presented in Yin (2009) and is detailed in the sections below.

Plan

The first steps in conducting a case study are to identify the problem being investigated and determine if a case study is the appropriate research method (Yin, 2009). The research problem and underlying decision is detailed in Chapter 1. The issue requires a qualitative approach to research, eliminating the quantitative methods as options. There are no quantitative methods of addressing enterprise level IS deficiencies as it is a management, policy, and leadership issue.

There are numerous qualitative research methods that were considered but the case study was the ideal option. The ethnography method was not appropriate because the research was not addressing a cultural issue in which we had to observe a person, program or event in their/its

natural setting (Leedy & Ormrod, 2010). The phenomenological study was also not the optimal option as the research problem did not call for an investigation into people's perceptions, perspectives and understandings of a particular situation (Leedy & Ormrod, 2010). The grounded theory is not appropriate for this study because the data collected in this study will not be used to develop a theory but make managerial implications based on the findings (Leedy & Ormrod, 2010). Lastly, the content analysis approach was inappropriate for this study because the research does not require identification of patterns (Leedy & Ormrod, 2010), only an analysis of the current application of the IS compared to recommended practices found in the literature review. Content analysis, however, was used in the literature review section to identify common patterns in the existing research, which help address the research and investigative questions of the case study.

The case study approach is the correct research methodology for the problem being investigated because the problem addresses how the technical, organizational and managerial processes of the IS can be improved. While it may be the optimal method, there are limitations of using a case study. The biggest limitation is that a case study has the potential of being subjective. The data collected in a case study can be interpreted in multiple ways and may lead to poor analysis and conclusion. Another limitation of a case study is that the quality of the data relies on the knowledge and skills of the investigator(s). If an investigator has poor interviewing skills, the data collected from his/her interviews will be incomplete or contain poor information.

Design

The design stage of a case study requires defining the study's unit of analysis. In this case study, the DSOR II IS is the unit of analysis. In order to address the underlying problem, the focal point for the research must be the IS being used by the case study organization. Using

the DSOR II as a focal point, the research will address other strategic and organizational issues that are involved in effectively managing DSOR II.

The case study question began as "how does the DSOR team address data discrepancies within its DSOR II IS?" After investigating the underlying issue to the DSOR team's challenges, the study proposition became "how does an organization design an effective IS in the absence of an effective enterprise-level IS?" The underlying problem is discussed in Chapter 1, where the research and investigative questions are listed. The study proposition is the basis of our literature review, which can be found in Chapter 2. The literature review is used to develop a framework for how an organization can address enterprise level information system deficiencies based on findings from existing research.

Another aspect of the design stage is selecting the type of case study that is to be conducted. A single case study design was selected for this research because of the theoretical framework used to evaluate the identified phenomenon. The literature review developed a conceptual framework, which is used to evaluate the DSOR II program. The framework was developed with a thorough content analysis of 48 academic sources. It combines sound methods for developing an IS business case, IS design factors, and diffusion. This case study tests a well-formulated theoretical framework. The use of a well-formulated theoretical framework is an acceptable rationale for a single case study (Yin, 2009).

Prepare

Once the case study approach is selected and the research and investigative questions are identified, the next stage is to prepare to conduct the case study. It was important to gain approval for human subjects test since the case study collection method includes interviews. It is also important to develop case study protocol and identify data collection procedures

Human subjects interview requirements

This case study includes interviews with various stakeholders in the DSOR process. The interviewer, Capt Dipta Kazi, conducted basic human subject research training designed by the Collaborative Institutional Training Initiative (CITI). This training included ethical testing concepts, including informed consent, privacy and confidentiality, vulnerable subjects, conflicts of interest and more.

This research qualified for an exemption from human experimentation requirements because of the methods in place to safeguard any identifiable information that may have negative impacts to the subjects. The approved exemption memorandum is provided in Appendix 4.

. This measure is in place to safeguard the interview subjects from any negative repercussions for the unclassified information he/she contributed to the research. Any personally identifiable information will be hidden in this report. The interview documents will be kept separate and accessible only to the investigators; Capt Dipta Kazi, Lt Col Matthew Douglas and Dr. Alan Johnson. The interview subjects are also required to sign a consent form detailing the interview procedures and risks. A sample consent form is provided in Appendix 5.

Interview methods

It is also important to identify the data collection procedures in the preparation stage. The interview subjects were determined based on their role in the DSOR process. The key stakeholders were identified in meetings and discussions with the DSOR team members. Stakeholders outside of the DSOR team include item managers, program managers, members at the depot, and IS experts involved in the DSOR process. The method of reaching the interview subjects was limited by time, ability to travel and funds. Subjects co-located with the research team at Wright Patterson Air Force Base (WPAFB), Dayton, Ohio were preferred because they

could be met with in-person. If the interview subject was not located at WPAFB, the interview was conducted via telephone or electronic mail (e-mail).

Access to interview subjects

Gaining access to the interview subjects was a challenge which needed to be addressed. We began by soliciting interviews from subjects who had established professional relationships with the DSOR team. The second approach was to identify stakeholders from the Enterprise Solutions - Supply (ES-S) IS database and solicit their participation via email and phone calls. Each of the interview subjects were provided the consent form and a summary sheet to give them more detail of the research being conducted. The summary sheet is provided in Appendix 6. The response rate from the subjects was satisfactory.

Interview questions

The next step in the preparation stage is creating a set of questions to guide the discussion during the interviews. These questions were used as a starting point of the discussions and follow on questions were asked based on the subjects' response. The questions varied slightly based on the stakeholder but were similar for each of the interviews. Interview subjects were informed that the objectives of the interview were to understand the process of working with other DoD stakeholders in managing depot source of repair information for USAF assets and learn about the IS/software the interview subject used to manage USAF assets. Sample interview questions can be found in Appendix 7.

Data evaluation

The information gathered from the interview subjects was used primarily to verify information already gathered from other sources or gain new information which can be verified

by other sources. This is important in establishing the validity of the data collection method. Information should be verified by more than one source in order to reach a reliable conclusion.

Resources

The DSOR team at HQ AFMC provided the research team with resources necessary to conduct the study case. The most important resource provided was open access to discuss the case and request data from the DSOR team. The researcher was set up with a work station co-located with the DSOR team, along with a laptop computer and monitors. Researchers were also given access to the DSOR II IS system and provided assistance with gaining access to other USAF IS pertinent to the study. The DSOR team provided all the support and resources necessary to execute the case study design and objective.

Collect

Multiple sources of evidence were used to collect data for the case study. The data was recorded in a case study database and multiple chains of evidence used to verify findings. The sources of evidence used included documents, archival records, interviews, direct observation, and physical artifacts.

Documents

The case study research data included memoranda, email correspondence, individual information databases, meeting minutes, reports, internal records, and contract documents. These documents were collected from the DSOR teamwork files, the various stakeholders involved and open sources available through the Air Force Portal. A list of documents collected and used for analysis in the case study is provided in Table 6.

Table 6: List of Documents Reviewed

Name of Document
1 - DSOR II Contract (Performance Work Statement)
2 - AFMC Workload Distribution (50/50) Reporting Process 101 (Slide presentation)
3 - Office of Secretary of Defense Report on DoD Military Maintenance Budget
4 - Technology Repair Center (TRC) 101 Review (Presentation slides)
5 - DoD Depot Maintenance Map
6 - D200A IS Input and Output Map
7 - DSOR 101 User Training (Presentation Slides)
8 - Enterprise Information Technology Data repository (EITDR) Audit Report
9 - 10 USC Section 2460 “Definition of Depot Level Maintenance and Repair
10 - 10 USC Section 2464 “Core” Law
11 - 10 USC Section 2466 “50/50” Law
12 - Air Force Handbook (AFH) 23-123 Materiel Management
13 - Air Force Instruction (AFI) 21-118 Maintenance
14 - AFI 63-101/20-101
15 - AFI 23-101 Materiel Management
16 - Air Force materiel Command Instruction (AFMCI) 21-101 Depot Maintenance Activation Planning
17 - AFMCI 23-101 Acquisition Management
18 - AFMCI 23-104 Functions and Responsibilities of the Equipment Specialist During Provisioning
19 - AFMCI 23-109 Applications, Programs, and Indentures
20 - AFMCI 23-112 Management of Items Subject to Repair (MISTR)
21 - Depot Maintenance Senior Leaders’ Maintenance Course (Presentation slides)
22 - DoD Directive 4151.18 Maintenance of Military Materiel
23 - Organic Depot Activation Process Map
24 - TO 00-25-195 AF Technical Order System Source, Maintenance and Recoverability Coding of Air Force Weapons Systems and Equipments
25 - USAF Supply Support A Team Approach
26 - Global Combat Support System – Air Force Customer Service Guide
27 - Product Support Tool Kit (PSTK)
28 – 50/50 Data Flow Map
29 – Acquisition Lifecycle Management Process Map
30 – AFMCI 21-101 Depot Maintenance Activation
31 – AFMCMAN 23-5 D035A

Archival records

The records primarily involve the DSOR database going back to the early 1980s. The DSOR II contractor was still in the process of entering this data into the DSOR II IS during the case study. A list of archival records reviewed in the case study is provided in Table 7.

Table 7: List of Archival Records Reviewed

Name of Archival Record
1 - Final DSOR Decision Memo (DSOR # 13609F)
2 - 13609F Joint DSOR Decision Memo (DSOR # 13609F)
3 - DSOR Team 50/50 Database
4 - Minutes of Spares Provisioning Conference for C-5 AMP Depot LRU
5 - Meeting Minutes: C-5 Modernization Program – Depot Maintenance Activation Working Group (DMAWG)
6 - Depot Activation Checklist – APG-63(V)3 Active Electronically Scanned Array Radar Program
7 - Depot Maintenance Activation Working Group Charter – APG-63(V)3 Active Electronically Scanned Array Radar Program
8 - Depot Level Repair Integrated Master Schedule - APG-63(V)3 Active Electronically Scanned Array Radar Program
9 - Depot Maintenance Activation Plan - APG-63(V)3 Active Electronically Scanned Array Radar Program
10 - Depot Repairable Candidates List – F15E Radar Modernization Program System Development & Demonstration Phase
11 - Meeting Minutes – APG 79 REX & CISP weapon system
12 - Source of Repair Activity (SORA) F-15 LRU Weapon System
13 - Depot Military Inter-service (DMI) Worksheet

Interviews

A total of 17 semi-structured interviews were conducted to collect information from various stakeholders. These stakeholders include DSOR team members, Program Managers, Item Managers, end-users, IS experts, and other process owners. The stakeholder, interview date, and interview method are listed in Table 8. The data collected from the interviews are stored in a case study data base and analyzed in Chapter 4. Personally identifiable information is

omitted to protect interview subjects from any negative impacts which may arise from the information he or she contributed to the case study.

Table 8: List of Stakeholder Interviews

Stakeholder	Date	Interview Method
1: DSOR Team member	10-Dec-14	In person(WPAFB)
2: DSOR Team member	10-Dec-14	In person(WPAFB)
3: DSOR Team member	16-Dec-14	In person(WPAFB)
4: DSOR Team member	16-Dec-14	In person(WPAFB)
5: DSOR Team member	11-Apr-14	In person(WPAFB)
6: DSOR Team member	18-Apr-14	In person(WPAFB)
7: DSOR Team member	18-Apr-14	In person(WPAFB)
8: Program Manager (F-16)	16-Oct-14	In person(WPAFB)
9: Program Manager (HH-60)	16-Oct-14	In person(WPAFB)
10: Program Manager (Tinker)	6-Oct-14	In person(WPAFB)
11: Item Manager	21-Oct-14	Electronic mail
12: Item Manager	14-Oct-14	In person (WPAFB)
13: Item Manager	10-Dec-14	Telephone
14: End user	18-Jul-14	In person (WPAFB)
15: End user	17-Sep-14	In person (WPAFB)
16: WebFLIS IS expert	27 Jul 14	Electronic mail
17: Provisioning Process Expert	15-Dec-14	Electronic mail

***Direct observation*.** Captain Dipta Kazi spent an average of 5-10 hours most weeks at his work station with the DSOR team during the period of January 2014 to January 2015. During this time, he worked on gathering information through formal and informal discussions, preparing for and conducting interviews and conducting research on various USAF IS. During his time at AFMC, he was able to observe meetings, informal discussions, employee interactions, and assess the morale of the work force. He was able to observe how employees dealt with technological and workflow issues caused by the DSOR II IS and how the employees addressed those issues.

Participant-observation. Captain Dipta Kazi gained access to the DSOR II IS and became an active user. He learned to navigate information, conduct searches, and understand its workflow process with the help and training of DSOR team members. He also gained access to multiple USAF logistics IS to compare data. Description of these IS are detailed in Table 9.

Table 9: IS Descriptions

Information System	Description
Depot Source of Repair II Sharepoint IS (DSOR II)	The DSOR II IS is a standalone database used solely by the AFMC A4 DSOR office to manage their approvals Federal Logistics Information System Web Search (WebFLIS) – Joint database of national stock numbers (NSNs) managed by the Defense Logistics Agency designed to minimize multiple part numbers for the same assets.
Logistics, Installations, and Mission Support – Enterprise View (LIMS-EV)	An Air Force enterprise level reporting and analytics tool spanning Executive, Logistics Readiness, Requirements, Maintenance Repair and Overhaul, and Installation and Mission Support.
Enterprise Solution Supply (ES-S)	ES-S is a supply tool, which provides role-based access to Air Force logisticians through the Air Force portal and integrates data from numerous legacy systems into one interface. Its functions include data visibility, transaction processing, order management, shipment management, asset management and asset redistribution.
D043A Master Item Identification Database	Allows menu-driven interrogation of data derived from the IMCS and other systems. It also provides on-line access to certain data segments of FLIS. D043A enhances user‘s ability to perform research and to identify and resolve logistics data problems in support of the AF mission.
Navy DSOR Depository	Joint database currently managed by US Navy DSOR office consisting of DSOR approval decisions dating back to the late 1980s. This database was used by a joint organization charged with making DSOR location decision. This joint office was dissolved in 2009 due to its long review process, which caused delays in the acquisition pipeline. The DSOR location decision-making responsibilities have since been delegated to the respective branches.
Web Federal Logistics Information Service (WebFLIS)	The WebFLIS service from the Federal Logistics Information Service (FLIS) of the Defense Logistics Agency (DLA) is an online search system for several public segments of the USA Federal Logistics Database for codified supplies that are represented by a permanent National Stock Number (NSN). (Defense Logistics Agency, 2015)

Secondary Item Requirement System (SIRS) (D200A)	The primary function of the D200A is Requirements Management. The SIRS maintains visibility on all recoverable and consumable spares while computing buys and repair requirements on a quarterly cycle. Examples of recoverable items include avionics subsystems, ground communications equipment, and airborne electrical power generators. Provides indication of items subject to buy, repair, termination, and disposal. Provides online maintenance and interrogations. Included within this subsystem is the ability to perform online item recomputations and batch group recomputations. Approximately 200,000 items are processed by this subsystem. Processes performed include maintaining past usage data, forecasting trends and applying programs and assets in computing future buy and repair requirements (Defense Acquisition University, 2014).

Analyze

The data collected using the multiple sources listed above are analyzed in greater detail in Chapter 4. The analysis relies on theoretical propositions found in the literature review to establish a pattern among the data collected. The advantage to using multiple sources of data collection is being able to verify and validate the information used in the case study analysis and findings. It builds construct validity, a key aspect needed to conduct a strong case study.

Share

Once the case study is completed, the information will be presented to the AFIT community in this thesis report and thesis defense presentation. The DSOR team is an important audience for this case study and will be presented with this information in a briefing. The information found in this case study can be of assistance to managers and supervisors facing similar IS issues discussed in this research. They may find this information in future journal publications.

IV: Case Study Analysis

The DSOR team observed multiple issues which needed to be further researched and addressed in this case study. One of the main issues identified by the DSOR team is that the DSOR II data is incomplete and unreliable. There are reparable parts in use throughout the USAF which are not recorded in the DSOR II database. Many of the parts that are found in the DSOR II database do not have the correct DSOR location. This means that there are changes being made to DSOR locations without approval from the DSOR team once parts are in the sustainment phase. The DSOR II IS has no means of capturing these changes since it does not exchange data with any other IS.

Another significant challenge is that DSOR II users cannot search using the same unit of measure used by most USAF supply chain stakeholders and IS. When the DSOR request first arrives to the DSOR team for approval, parts are identified and recorded by its system or subsystem. This means that there would be one DSOR request for an entire system (i.e. F-22 aircraft) or subsystem (i.e. F-22 engine). The system or subsystem is identified by the many parts which make up the system or subsystem and given a national stock number (NSN). The NSN is the primary unit of measure used by nearly all USAF supply chain stakeholder. This disconnect makes it difficult, if not impossible, to find data within the DSOR II database.

The issues identified by the DSOR team were all connected and needed to be addressed in conjunction with one another. Addressing the issues individually would not generate a feasible solution to their underlying problem. The underlying problem of this research is that the DSOR team is faced with a poor enterprise-level IS and must develop an IS which helps it accomplish its mission. The literature review helps address how an organization may do just that. In addressing the underlying problem, this case study evaluates the entire DSOR project and

uncovers challenges beyond those identified by the DSOR team. These challenges are interrelated and must be addressed in conjunction with one another to truly mitigate the underlying issues. The findings from the literature review are used as a guide to evaluate the DSOR II IS. The following sections detail the case study findings in the business case, IS design and diffusion stages of the DSOR II program.

Case Study Analytic Strategy

The data analysis was conducted following methods recommended Yin (2009). The case study is guided by the research question, which is broken into three investigative questions. Each of the investigative questions is categorized into three arrays and contributes to answering the research question. The three arrays are IS business case development, design and diffusion. The literature review is then used to develop theoretical proposition for each of the investigative questions. These theoretical propositions are then combined to develop a framework which addresses the overall research question.

The data collected in the case study are categorized into the three arrays. In essence, a matrix of the three categories was created and related evidence was placed within each category. Various data displays are created using the data collected. The data displays are used to determine and formulate findings and information required by the respective arrays. Once the data was collected in the case study research, it is then compared with the theoretical proposition developed before the data was collected. This analytical technique is called pattern matching (Yin, 2009). By applying the data collected in the DSOR case study to the theoretical framework, we made a theoretical replication to determine how the DSOR case study may best address the research question (Yin, 2009). If the case study data analysis does not coincide with any portion

of the theoretical framework, it is identified as an area for improvement and managerial implications are recommended.

Business Case Development

Developing an effective business case is an important step to creating an effective IS. The literature review conducted in Chapter 2 provides a guide for how to establish an IS business case based on existing research and theories. This section uses the findings from the literature review to evaluate the DSOR II IS.

Align organizational and IS strategies

Understanding the organizational mission and strategy is the first step to developing the IS strategy. The mission statement and vision is formalized by the AFMC/A4 office and is detailed below (AFMC/A4, 2014):

Mission Statement:

> Shape the workforce and infrastructure to provide logistics and sustainment support for...Acquisition logistics, Supply management, Depot maintenance and Base-level logistics operations...resulting in war-winning expeditionary capabilities

Vision:

> To exceed our customer expectations, providing the most cost effective, timely and flexible logistics products and services into the 21st century

The DSOR team falls under the acquisition logistics and depot maintenance functions as stated in the mission statement. Based on the mission statement the DSOR team must aim to provide war-winning capabilities in its specific tasks. In accomplishing its task, the DSOR team is to provide outstanding service which exceeds customer expectations, be fiscally responsible,

and be flexible in what it does. The AFMC/A4 provides general guidance for what the organization must aim to do but leaves much of the specific instructions up to interpretation.

The DSOR team must first identify its customer, and provide the customer timely and quality customer service in a cost effective manner while maintaining flexibility in its processes. It is very important to first determine the DSOR team's customers. The DSOR team's formally recognized customers are the AFMC community and the joint logistics community (AFMC A4D, 2014). The organization's output is part of a larger acquisition process which aids stakeholders in the AFMC community. Some of its outputs aid stakeholders outside of the USAF. This is discussed in more detail later in this chapter.

The AFMC community, primarily Program Managers, may be the DSOR team's primary customer but it is not DSOR II's primary customer. The DSOR II IS is a system which enables the DSOR team to accomplish its tasks with input from external stakeholders. The output produced with the assistance of DSOR II is ultimately used by external stakeholders. The DSOR II workflow process tool does not assist other stakeholders in accomplishing their tasks, only the DSOR team tasks. The DSOR team requires external stakeholders to interact with DSOR II to enable its mission and provide a service. It does not matter to the stakeholders if DSOR II is used to produce the output as long as it receives the approval memo, report or support provided by the DSOR team. The issue of the DSOR team's customers is discussed in a later section. This section takes the broad organizational strategy set as provided by the AFMC/A4 and develops an IS strategy set for the DSOR II project.

The DSOR II strategy set must include the *system objectives*, a list of its constraints, and a strategy for executing the IS strategy. The current DSOR II system objectives are (AFMC A4D, 2014):

1. Utilize MS SharePoint to execute standardized DSOR Workflow Process within AFMC community
2. Allow for joint expansion into other DoD agencies
3. Generate ad hoc reports to support execution & management of AFMC Workflow processes
4. Produce financial reports of DoD Depot Repair Program to help ensure compliance with Title 10 Laws
5. Provides audit trail/documents source of repair (SOR) decision for life of the system

Some of the *constraints* and challenges an IS with these objectives would face are exceeding the organization's scope and authority, integrating any legacy systems, inter-departmental collaboration, funding, business process knowledge, information technology expertise, IS compatibility and interoperability, and user acceptance. These are all issues that the DSOR team must address to field an effective IS and are discussed throughout this chapter. The *strategy* to develop the DSOR II IS is to outsource the development and maintenance of the DSOR II software through a government contract. This is the optimal strategy because of their lack of organic software engineering capability.

The managerial implication is to align the DSOR team's organizational and IS strategies. In order to do that, the DSOR team must focus its resources on making the DSOR II an effective IS for the DSOR team. Details on how it may make DSOR II a more effective tool is provide later in this chapter. The DSOR II project must prioritize the DSOR II team as its primary stakeholder before focusing on the AFMC community or other service branches.

Enlist support at appropriate level

The literature review established that it is important for an IS project to be led with the proper authority and scope. The DSOR II is designed to help the DSOR team accomplish its tasks and produce an output which helps the AFMC community execute the larger acquisition

process and effectively manage the USAF supply chain. It would not be useful to implement DSOR II as a DSOR database and workflow process management tool to other services without significant improvements to its current state. The DSOR II database capabilities are inaccurate, incomplete and require managerial attention before it can be of use to the DSOR team, let alone external stakeholders. The DSOR II's workflow process management functions also needs significant adjustments and is not ready for joint use.

A simplified organizational structure is shown in Figure 8. This structure depicts where the DSOR team falls within the DoD organizational structure and where the other key DSOR stakeholders work. The DSOR team is not in a position of having the necessary strategic outlook, financial resources, technical expertise, business process knowledge, or authority to implement an inter-service IS across the DoD. Once the DSOR II IS database and workflow functions are improved, the DSOR project team may elevate a business case up to the DoD leadership atop its organizational structure.

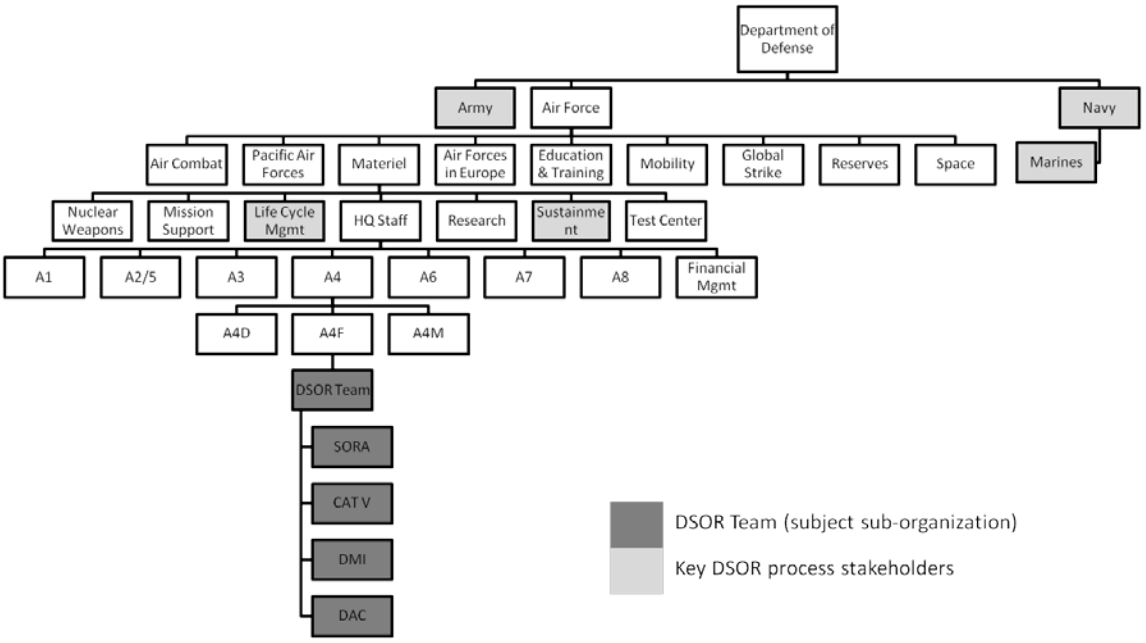


Figure 8: DSOR Team Organizational Structure

Evaluate Organizational Capabilities

Evaluating the organization's capabilities is an important part of establishing what type of IS will be required and the resources needed to make it successful. The literature review found a list of uncontrollable, partially controllable, and fully controllable factors which help evaluate the organization's capabilities. The factors which were evaluated as potential issues in the effective management of the DSOR II program are marked with a grey box in Table 10. These capabilities were analyzed and evaluated using information from DSOR team member interviews and informal discussions, direct observations, documents, archival records, and user participation.

Table 10: DSOR Team Organizational Capabilities Analysis

Uncontrollable factors	
	Organizational size
	Organizational structure
	Organizational time frame
	Extra-organizational situation
	IT products in market
	External expertise & service availability & support
	Process compatibility
Partially controllable factors	
	Firm's knowledge resources
	Financial resource availability
	Organization's technical expertise
	Knowledge acquisition/application/sharing
	CEO's support and commitment
	Organizational maturity
	Organizational climate
Fully controllable factors	
	Training availability
	Steering committee
	Users' participation and involvement
	Integration of internal processes

The organizational factors which pose the most immediate threat to the successful development and implementation of the DSOR process are process compatibility, firm's knowledge resources, financial resource availability, organization's technical expertise, organizational climate, the steering committee, user's participation and involvement, and integration of internal processes. While these are significant challenges, there are mitigation methods available to address the issue and make DSOR II an effective IS. None of these issues give cause to abandon the project.

Process Compatibility. There are multiple business processes performed by the DSOR team which are not incorporated into the DSOR II workflow management tool. These processes are discussed in greater detail later in this chapter. Most of those processes are controllable and may be addressed internally. The process which cannot be controlled by the DSOR team is the acquisition process for the Navy, Army and Marines. In order for DSOR to be truly joint and of benefit to other branches, the DSOR team must align the separate processes for DSOR approval and incorporate it into DSOR II. This is not an impossible task but is something which must be led by an organization with higher authority within the DoD. Further research should be conducted to map the DSOR process of the other services. The DSOR team would need to elevate its efforts to standardize the DSOR approval process throughout the DoD and gain DoD leadership support to shape DSOR II into a truly joint IS.

Firm's Knowledge Resources. The DSOR II project team is challenged with streamlining a portion of a complex acquisition process. It can be challenging to capture the roles of all the stakeholders in the DSOR process well enough to build an IS to manage its workflow. There are some challenges to developing cross-functional processes and IS. The way to address this knowledge gap is to include other stakeholders in the project team. Different stakeholders

will contribute a perspective which is valuable to the development and implementation of an effective IS.

Financial Resource Availability. Any changes to the DSOR II contracts which may require additional work will require more funding. This is an important factor in scoping the IS design. There is no point in designing an IS which the organization cannot afford. The DSOR II project team must consider the potential for funding any deviations from the current contract before pursuing design changes or improvements.

Organizational Technical Expertise. The DSOR team's IS technical expertise resides in the contractors which manage DSOR II. It is important to have IS technical experts in the project team to help develop a strategy and the requirements for the IS. There is no technical software or MS Sharepoint expertise on the DSOR II project team. There are, however, technical experts within the AFMC staff which may be helpful in managing the DSOR II project.

Organizational climate. A recent downsizing of the HQ AFMC staff has led to the loss of a position within the DSOR team. This development has impacted the team's morale, which may contribute to its resistance to new innovation and changes. It is important to take these factors into consideration before introducing new changes. Overall, the DSOR team has good leadership and morale is high. The work environment is relaxed and people are comfortable communicating with one another.

Steering Committee. The DSOR II project team does not include all internal or external stakeholders. It should, at a minimum, include members from each of the DSOR team's sub-sections (DMI, SORA, DAC, CCD), at least one program manager and item manager. This type of collaboration will be effective in developing a useful IS and addressing much of the current issues.

User Participation and Collaboration. The DSOR II IS does not incorporate all the processes managed by the DSOR team. This has led to DSOR team members developing their separate excel databases and processes which are managed outside of DSOR II. This lack of participation has led to little collaboration. This is not the fault of the members but the IS for not addressing their needs. The DSOR II IS needs to incorporate all the processes executed by the DSOR team in order for them to find value in it.

Integration of Internal Processes. As mentioned in the paragraph above, DSOR II does not capture all processes of the DSOR team. There was another significant process gap which needs to be addressed. When DSOR requests arrive to the DSOR team, the program is still in the system or subsystem level (i.e. F-16 aircraft, or F-16 aircraft engine). Later on in the larger acquisition process, after the DSOR has been approved, the weapon system is broken down into parts or NSNs. The end users' unit of measure is in parts, not system or subsystem. The USAF operates using NSNs while the DSOR II database contains records using system or subsystem. This makes it difficult to search of parts by its national stock number (NSN) in DSOR II. The DSOR II team members have to search in other databases to find the information they need. DSOR II database is using a different unit of measure than the rest of the USAF supply chain because of its current process. The DSOR team must input records in terms of parts or tie its DSOR approval number to the individual part in order to address this issue. If the USAF logistics IS contained this approval number under each part or NSN, the DSOR team can connect the part to the corresponding DSOR approval.

Map Information Flow

Understanding how the information must flow inside and outside the organization is a critical part of designing an effective IS. Part of the case study is understanding the information

flow of each process conducted by the DSOR team and mapping how the information flows in executing those processes. The data sources to determine the information flow for each of the DSOR process is listed in Table 11.

Table 11: Information Process Flow List of Sources

Process	Source
DSOR Approval	AFMC/A4DC, 2014 AF/AQXA, 2013
DMAWG Support	AFLCMC/LG, 2014 AFMC/A4DC, 2012 DSOR Team Member #3, 2014 DSOR Team Member #4, 2014
Periodic Review	AFMC/A4DC, 2014 AF/AQXA, 2013 DSOR Team Member #5, 2014 DSOR Team Member #6, 2014
Joint DMI	DSOR Team Member #7, 2014 AFMC/A4DC, 2014 AFMC/A4DC, 2012
Annual Budget Reporting	AFMC/A4D, 2011 DSOR Team Member #2, 2014 Office of the Secretary of Defense, 2013

The DSOR team has five processes which produce five different outputs for various USAF supply chain stakeholders. The first and primary process of DSOR II is the DSOR approval process. This is the process in which PMs initiate a DSOR approval request in DSOR II. The DSOR team performs its tasks and obtains AFMC/A4 director approval (this authority is given to the AFMC Commander and has been delegated to AFMC/A4 director). There are multiple tasks performed by the DSOR team in this approval process which are managed outside the DSOR II IS. These sub-tasks are performed outside of DSOR II because it is not designed to perform those tasks or the sub-tasks are too difficult to integrate into the DSOR II workflow. Once the DSOR memorandum is signed, it is sent back to the PM to continue on to the next step of the acquisition process.

The next process is providing support to the Depot Maintenance Activation Working Group (DMAWG). The DMAWG works as a planning group of all necessary stakeholders to ensure funding, contracting, and delivery of the data required to establish depot repair capability. A member of the Depot Activation Cell (DAC) is involved in the DMAWG to provide support to the PM and ensure the requirements have not changed enough to require a new DSOR approval. This support requires attending meetings, conferences, and correspondence. This process simply involves providing support to the DMAWG in case a DSOR shift is needed.

A periodic review of each weapons system or DSOR approval is required every five years. The DAC currently conducts the review every three years. The periodic review involves working with the PM to assess and revalidate the initial strategy as set by the program office (AF/AQXA, 2013). The periodic review may result in adjusting resources and requirements based on performance and war-fighter needs. The DSOR II IS initiates the periodic review of DSORs approved three years ago and prompts the DAC to obtain information from the PM whom updates the project funding data. This process is performed very well in DSOR II.

The Joint DMI process is the DSOR team providing concurrence with the Army, Navy, or Marine DSOR team's DSOR decisions. Once the DMI section receives a concurrence request via email, it validates whether the USAF has the same repair capability. The process is set up to ensure the DoD minimizes unintended duplication of depot repair capabilities across the services. The DMI section responds with its concurrence once it determines the USAF does not have a similar capability. It is rare for any of the service to non-concur with another services' request for concurrence (DSOR Team Member #7, 2014). This process is conducted outside of DSOR II.

The annual budget reporting process is another process conducted outside of DSOR II. The CCD team collects financial information from 14 various USAF supply chain stakeholders every November to report the USAF depot repair expenditures and future budget to the Office of the Secretary of Defense (OSD) by the following March. The OSD then compiles the report from each service to report to Congress (AFMC/A4DC, 2014).

The five processes executed by the DSOR team are summarized in a process map in Figure 9. Each of the five rows represents a separate process. The first column indicates the stakeholder from which the DSOR team receives the information or request necessary to execute the process. The input column indicates the information given to the DSOR team. The third column indicates which sub-section within the DSOR team receives the information. The fourth column indicates the output or service provided by the DSOR team. The fifth column indicates the customer or USAF supply chain stakeholder that receives the DSOR team's service. The information flow in the figure is indicated by either a solid or a dashed line. The solid line means that the information or task is conducted in the DSOR II IS. The dashed line means the task is completed, or the information is shared, outside of DSOR II. Generally, this means the information is being communicated via e-mail or stored in an individual excel database outside of the DSOR II IS.

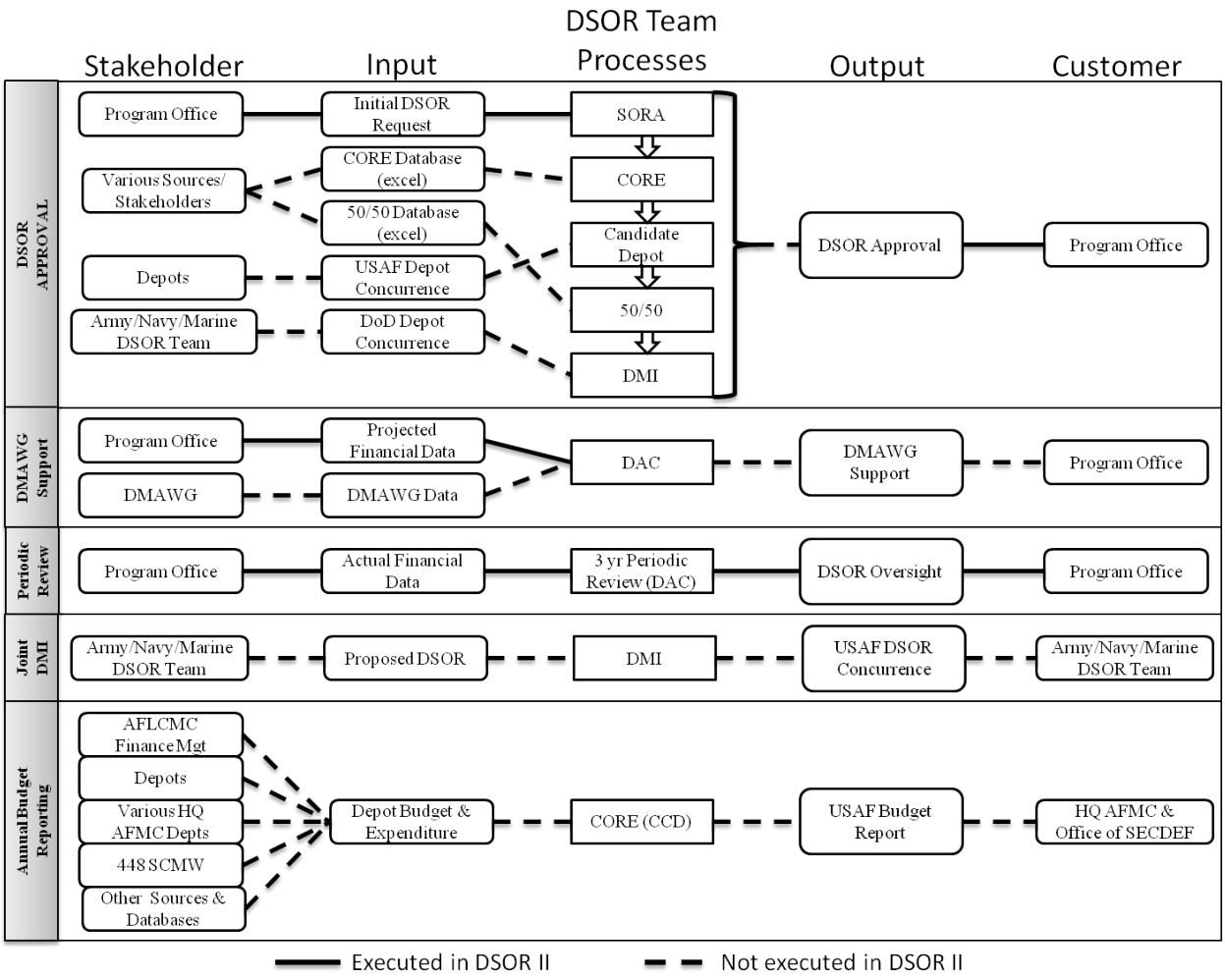


Figure 9: DSOR Process & Information Flow (Internal)

Determine Business Process Reengineering (BPR) Feasibility

Determining the feasibility of business process re-engineering is essential to the successful implementation of an IS. This case study maps out the USAF DSOR process from acquisition to sustainment. The data sources used to determine each DSOR process in the acquisition system is listed in Table 12.

Table 12: DSOR Information Flow List of Sources

Process	Source
Program Manager Initiates DSOR	AFMC/A4DC, 2014 AF/AQXA, 2013 AFLCMC/LG, 2014
DSOR Team Approves DSOR	DSOR Team Member #1, 2014 AF/AQXA, 2013 AFMC/A4DC, 2012
Program Manager Initiates DMAWG/Provisioning	AFMC/A4DC, 2014 AFMC/A4DC, 2012 DSOR Team Member #3, 2014 DSOR Team Member #4, 2014
Depot Activation	AFLCMC/LG, 2014 AF/AQXA, 2013 Program Manager #1, 2014
Equipment Specialist inputs DSOR data into D200	AFLCMC/LG, 2014 Provisioning Process Expert, 2014
D200 collaborates data with other IS once the part is fielded and requires sustainment	AF/A4LM, 2013 End User #1, 2014

The DSOR process begins with the PM initiating a DSOR approval request to the DSOR team. The DSOR team then executes its internal process to obtain approval from the AFMC/A4 Director. This approval is then sent back to the PM, whose next step is to initiate the DMAWG and provisioning processes. There is no standardized IS which manages the information and the tasks involved in executing the DMAWG and provisioning processes. Once provisioning is complete, the depot repair capability is activated. This step is also conducted using an independent IS. During the activation process, the equipment specialist inputs part information, to include DSOR location, into the D200A IS. The D200A shares information with a vast network of IS which make up the USAF supply chain IS network. Some of the notable IS with which DSOR stakeholders interact includes LIMS-EV, WebFLIS, ES-S, and D043A. The DSOR information flow is mapped in Figure 10.

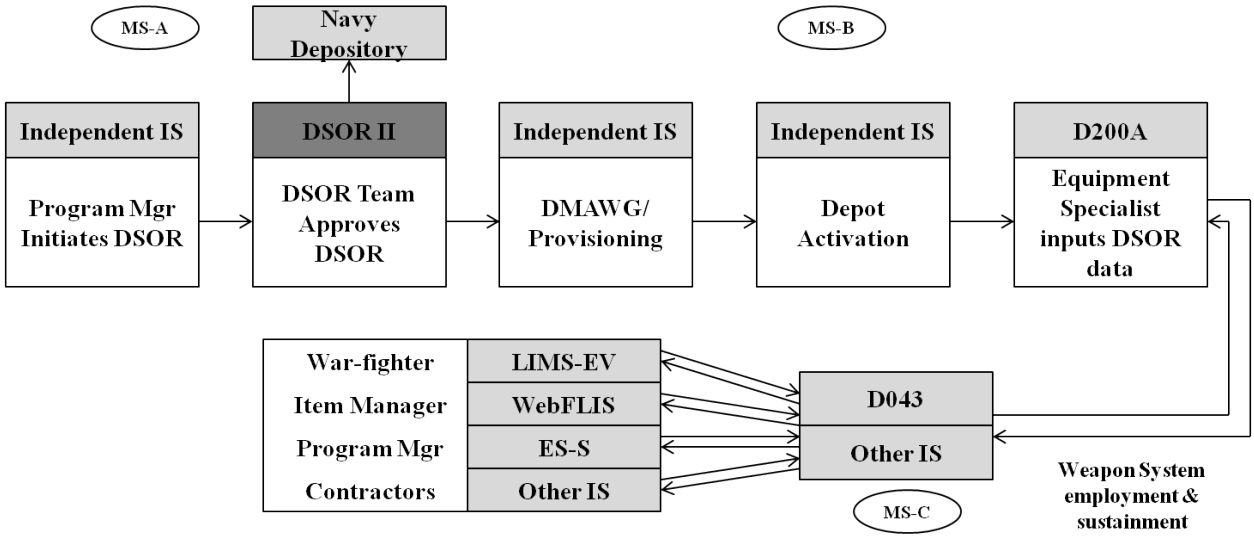


Figure 10: DSOR Information Flow (External)

The DSOR business process does not allow for information to be updated in DSOR II once the weapon system is in the sustainment stage. The systems are not integrated to exchange data with DSOR II. There are two potential solutions to this issue. The simpler of the two would be to add a field in D200A and subsequent IS which shows the DSOR approval number. This DSOR approval number may be used to link individual parts to the DSOR approval stored in the DSOR II database. This solution would require some process changes on the part of the PM and equipment specialist. It would also require a technical change to the D200A IS and other IS to add a field of entry in its interface. The second solution is to change the DSOR II database and record data by NSN. This would allow for data exchange with other systems. The D200A IS is the recommended system to collaborate information with DSOR II.

IS Design

An effective IS must have certain features and qualities which make it useful and effective before it can be implemented in the organization. The literature review on IS design functions revealed there are four primary functions that are essential to a successful IS. These

features involve data quality, system quality, interoperability, and end-user requirements. These features and functions were identified in the literature review as contributors to an effective IS and critical to successful implementation of an IS. The literature review also revealed that project manager must adopt good project management practices. The following sections will evaluate how well the DSOR II IS complies with the good software engineering functions and features and whether the project management team is using good project management practices.

Adopt good project management practices

The DSOR II IS project is in its sixth year of development. The project team is beyond the initial stages of project management. The current state of the project is being managed satisfactorily according to the recommendations in the literature review. T he DSOR II has had over five years to be properly structured and for the project manager to understand its requirements. Informal discussions with the project manager, participant observation of project team meetings and formal interviews have revealed the following information:

1. The project team is using Microsoft Project to set objectives and milestones.
2. The project manager holds meetings as necessary with the appropriate stakeholder (DSOR Team Member #1, 2014).
3. There is a lack of a project management team with representation from each of the key IS stakeholders (DSOR Team Member #5, 2014).

The key finding is that the project team must incorporate key stakeholders, both internal and external, in periodic meetings to develop and improve the IS. The DSOR II project is being well managed by the project manager under its current requirements. Part of the managerial implications resulting from this study may recommend the DSOR team change DSOR II

requirements or focus elsewhere. Any change in management priorities will require the project manager to adjust his management approach.

Employ Software Design Practices

An effective IS must have accurate data upon which the users and the organization can rely. Without quality data, the IS is obsolete and will not be useful to any stakeholder involved. The system must also be of good quality in terms of speed, availability and reliability. An IS which consistently hampers the users' ability to access information and perform their job will likely fail. The IS also needs to be interoperable with other IS if necessary. A standalone IS can easily become outdated and make the business process and data management more difficult. Lastly, the IS needs to meet end-user requirements. This involves technical and social requirements. The technical aspect of user requirements involve having a user-friendly interface, incorporating the users' tasks and process within the IS, and helping users perform his/her job with more ease. The following sections evaluate how well DSOR II achieves these four functions.

Data Quality. The DSOR team identified the quality of data stored in the DSOR II database function as poor and unreliable. Users have to search other databases such as LIMS-EV, WebFLIS and even commercial search engines to find information on parts. In order to identify the data quality of the DSOR II database, the case study compared the DSOR data in DSOR II, ES-S, LIMS-EV, Navy Depository, D043A and WebFLIS.

Four USAF weapons systems were selected for this data quality analysis. Two aircraft are fighters and two are cargo aircraft. The F-16 aircraft represents an older fighter aircraft while the F-22 represents a newer acquisition. The C-130 represents an older cargo aircraft while the C-17 is a newer acquisition. At least 10 parts (NSNs) from each aircraft were selected, five of which were the most critical parts in 2013 (known as "mission capable" or "MICAP" parts). The

rest of the parts were chosen at random. The study included 10 F-16 parts, 10 C-130 parts, 10 F-22 parts and 13 C-17 parts for a total of 43 parts. The DSOR location listed in each of the six IS was captured and compared to one another. The DSOR II data matched ES-S 23% of the time, LIMS-EV 14% of the time, the Navy Depository 55.8% of the time, D043A 21% of the time and WebFLIS 21% of the time and D200A 21% of the time.

The DSOR II database matched a reliable source (D200A) only 21% of the time. Another key finding is that a third of the parts could not be found in DSOR II. This can be attributed to the fact the part is simply not recorded or that the DSOR II system does not record DSOR data by NSNs. A list of the NSNs used in the analysis is provided in Appendix 8. The DSOR data comparison across six other IS shows the DSOR II database is both unreliable and incomplete. The percentage of parts which matched across each of the IS and the percentage of parts which could not be found in the IS is shown in Table 13.

Table 13: DSOR Data Comparison

	Matching DSOR Location							
	DSOR II	ESS	LIMS-EV	Navy Dep	D043A	WebFLIS	D200A	Missing NSN
DSOR II	-	-	-	-	-	-	-	32.6%
ESS	23.3%	-	-	-	-	-	-	4.7%
LIMS-EV	14.0%	69.8%	-	-	-	-	-	7.0%
Navy Dep	55.8%	11.6%	4.7%	-	-	-	-	48.8%
D043A	20.9%	62.8%	67.4%	9.3%	-	-	-	2.3%
WebFLIS	20.9%	62.8%	67.4%	9.3%	100.0%	-	-	2.3%
D200A	20.9%	74.4%	41.8%	9.3%	79.0%	79.0%	-	2.3%

Another measure of data quality is the financial information entered in to DSOR II during the DSOR approval process. The initial projections submitted by the PMs are not very accurate in comparison to the expenditures once the weapon system is in the sustainment stage. The first year expenditures projected by the program office was found to be accurate about 1% of the time

between fiscal year 1998 through 2012 (AFMC/A4DC, 2014). This discrepancy is significant and shows the poor reliability of DSOR II's financial data. The projected financial data cannot be used for reporting purposes or to make managerial decisions.

System Quality. There are numerous system quality issues with the DSOR II IS. This analysis is based on DSOR team member interviews and discussions, user participation, and direct observation. One of the most common issues with DSOR II is that it is slow to open and respond to user commands. This leads to user frustration and loss of confidence in the system. Another issue is the interface. The DSOR II Sharepoint site can be accessed through the Internet Explorer web browser. In order to search the DSOR database, users must download an access file onto his/her local hard drive and search for data in a separate Microsoft Access window.

Users have come to expect better interface and database management from other USAF Sharepoint tools. The USAF Evaluation Management System (EMS), Management Internal Control Toolsets (MICT), and Task Management Tool (TMT) are good examples of Sharepoint tools and systems with user friendly interface and reliable software systems. It is important for the DSOR team to identify the reason for the poor system quality and work with the contractor to address these issues. An IS expert from the AFMC staff should be present in coordinating with the DSOR II contractor to improve the system quality deficiencies. An internal IS expert would be able to communicate technical requirements and ensure those requirements are within the USAF Sharepoint capabilities.

Interoperability. The DSOR II IS is not interoperable with any other IS. Data from DSOR II is manually updated in Navy Depository every quarter but does not "push" or "pull" data from any other source. If it is not entered or modified manually, the data remains unchanged. The lack of integration with other IS has led to incomplete, inaccurate and outdated

data. It will be a challenge to collaborate and update data with other system because other systems store information by parts or NSNs while the DSOR II stores records in units of systems or subsystems. In order to integrate DSOR II with other IS, the DSOR database needs to record parts by NSN. To break each system or subsystem into parts will take a significant amount of effort and time. Once DSOR II data are broken into NSNs, the system may be set up to exchange information with the D200A system.

Making DSOR II interoperable with any other IS could be an expensive task. It is important to determine the availability of funds that will be required to expand the scope of the program. The added storage requirements, bandwidth and maintenance of the system will all contribute to the increased cost of integrating DSOR II with other systems.

End-user Requirements. The DSOR II IS can benefit from getting users more involved in making improvements. First, it needs to incorporate all the processes conducted by the DSOR team. Currently, DSOR II only incorporates part of the processes users must execute to accomplish their job. Partial task management means users have to use a different system or method to complete his/her other tasks. If the users do not find the IS beneficial to accomplishing their job, it will reduce their involvement and use of the system.

End-user requirements can be improved with greater customer involvement and support. The DSOR II IS must provide users better feedback on their performance and improve communication within the department. These two social functions will help users better identify with the tasks and increase job satisfaction.

Diffusion

Once the business case has been established and the IS is designed and developed, the organization is challenged with effectively incorporating the IS in the organization. The sections

below use findings from the literature review to analyze key aspects to successfully diffusing DSOR II within the DSOR team. These findings include using influential leadership support, establishing formal guidance, providing adequate training and support, and implementing feedback and continuous improvement methods.

Influential leadership support

The DSOR II program has good leadership support within the AFMC/A4 structure to perform its mission as for the AFMC community. The current project team does not have the level of support and influence to implement DSOR II across the other services. One minor recommendation is to further communicate the benefits and operational capabilities of DSOR II. This type of communication may enhance user opinion of the IS.

Establish Formal Guidance

The DoD as a whole does a good job of establishing formal guidance for its programs and systems. This is also the case for the DSOR II program. The DSOR team has formalized DSOR II within the organization through its training program and process integration. Users have a firm understanding of how they are expected to use DSOR II. The DSOR team also included DSOR II on the Enterprise Information Technology Data Repository (EITDR) to formally recognize it as an official USAF IS. There are no recommendations for establishing formal guidance.

Provide adequate user training & support

Training is an important part of gaining user acceptance and implementing an effective IS. The DSOR team members received initial training when the program was first fielded and they continue to provide other stakeholders face-to-face training as needed. Overall, the DSOR II program initial training efforts are to be praised.

One aspect that is lacking is refresher training. Users are knowledgeable of their tasks and little else. There is little to no overlap of individual tasks because members are comfortable with their responsibilities. This tunnel vision of tasks creates an issue of relying too much on one individual to accomplish tasks, and ultimately the mission. There are several tasks within the DSOR processes that can be accomplished by one individual alone. It is risky not to have overlapping capabilities in case any of those individuals are unavailable for any length of time.

Improved refresher training and cross training will increase users' ability to utilize all the functions of the DSOR II IS and minimize the risk of not being able to accomplish the mission if one person is unavailable. It is recommended that the DSOR team hold 45-60 minute training sessions each quarter to learn about any new features, highlight seldom used features, and cross train on other tasks.

Implement feedback & continuous improvement methods

It is important to focus on continually improving the IS and giving users the opportunity to provide feedback. The organization must communicate the importance of making the system user friendly and promote its feedback channels. The DSOR II IS currently has a good feedback option through its IS interface. Based on interviews and informal discussions, users seldom use this feature to provide suggestions for improvements or express their complaints.

The fact the DSOR team sought external assistance to improve the effectiveness of the DSOR II IS is a strong signal that it values continuous improvement. The project management team meets regularly and makes it a priority to address any feedback it does receive through the feedback function. It would be beneficial to communicate the feedback function within DSOR II so users are more aware of this option and can contribute to improving the system.

Theories and findings from the literature review were used in this chapter to evaluate the DSOR II IS. The analysis determined how the DSOR II fared in comparison to industry best practices and how the DSOR team can make improvements. The findings from the analysis and managerial implications from this chapter are summarized in Chapter 5.

V. Findings & Conclusion

This case study explored IS deficiencies hindering the activities of a USAF supply chain stakeholder. The literature review chapter identified theoretical approaches to best strategize, design and implement a successful IS. The DSOR II IS was evaluated using theories and existing research found in the literature review. A case study approach was taken to collect information, analyze the findings and make recommendations. The data collection sources included documents, archival records, interviews and discussions, observation, and direct participation. The data was then analyzed to identify any managerial implications in the DSOR II project. The key findings and managerial implications are summarized in the sections below.

Finding 1: Align Organizational & IS Strategies

The DSOR team's current customer is the AFMC community. Its processes are part of the USAF acquisition system and enable other stakeholders to execute its mission. The DSOR II IS is a tool developed to help the DSOR team execute its internal processes. While its internal processes require input from other stakeholders, the DSOR II does not benefit other stakeholders directly. The DSOR II project team must focus on incorporating the DSOR team's processes within DSOR II. Most, if not all, of DSOR II project effort and resources should enable the DSOR team to provide cost effective, timely and flexible logistics products and services to USAF war-fighters. The DSOR team's processes are summarized in Figure 9. It is recommended that the project team focus on incorporating each of the five processes and its information flow into DSOR II.

Finding 2: Mitigate Organizational Capability Roadblocks

There are two organizational capabilities which threaten the successful development and implementation of the DSOR II IS. The first capability is process compatibility. There are several issues which need to be addressed before DSOR II can be made a joint IS. The DSOR II project team must conduct further research to identify the Army, Navy and Marine DSOR processes and align the business process of each service with the DSOR II IS. The DSOR II IS in its current form would not be useful to any other service.

The second organizational capability which needs to be addressed is a knowledgeable, diverse cross-functional project team. This team needs to include stakeholders, both internal and external, to the DSOR II project team to provide input and identify user requirements. The project team also needs IS expert(s) to assist the team in identifying its technical requirements and communicating software engineering aspects of IS design to the contractor. This expertise may come from an organization within AFMC.

Finding 3: Incorporate DSOR Team Business Processes

DSOR II does not effectively capture the processes executed by the DSOR team in its workflow process function. There are sub-processes which are being executed outside of DSOR II because it does not support the users' tasks. The DSOR project team needs to work as a cross-functional team which involves internal and external stakeholders, USAF IS expert(s), and the contractor to incorporate all the DSOR processes into DSOR II.

Finding 4: Conduct Business Process Re-engineering

There is a disconnect in how DSOR II records DSOR data (by system or subsystem) and how the rest of the USAF supply chain records data (by NSN). This disconnect makes it difficult to search for data in DSOR II. Another challenge to having different units of record is that DSOR II cannot exchange information with other IS. The DSOR II project team needs to conduct further research to address feasibility of storing data in DSOR II by NSN instead of weapon system or subsystem. This needs to be the first step before DSOR II can be interoperable with another system such as D200A or D043A.

Finding 5: Address DSOR II Data Quality Issues

The accuracy, reliability and completeness of data contained in the DSOR II database function are poor. Data needs to first be stored in units which can communicate with other IS (by NSN) and it needs to be integrated with other systems which contain reliable information. The current process does not allow for DSOR II to be updated once there are changes in the sustainment phase. Exchanging data with a primary supply chain IS such as D200A or D043A would keep the DSOR II data up to date and reliable. Integrating DSOR II with other systems will require time and funding to increase its capabilities and capacity.

A temporary solution may be to give DSOR users access to D200A. This solution will require DSOR team members to access D200A to find information about a part. DSOR II users are currently search in multiple systems to find part data. The setback is that DSOR II becomes obsolete if users having to search in other databases for basic information DSOR II are supposed to store.

Future Research

There are several other areas of research identified in the course of this study. The four recommendations for future study involve developing the findings of this study and/or investigating potential issues identified in this study. Future areas of research include applying the IS development framework to other organizations in the USAF supply chain, studying the number of IS utilized by each USAF supply chain stakeholder in accomplishing their tasks, quantifying the operational or functional implications of a decentralized IS approach and evaluating how efficiently the DoD is using its repair capabilities.

Apply framework to multiple case studies

This study will put an emphasis on stakeholders and how they are handling the decentralized management of USAF supply chain IS. It will address if most stakeholders are establishing their functional IS and determine the impact that may be having on supply chain partners. This topic should be applied numerous supply chain stakeholders and essential turn this thesis into a multiple case study. Applying the framework on multiple organizations will help determine if the findings in this study is a pattern which needs to be addressed by leadership. It will provide insight into how well or poorly orgs are managing the decentralized approach

Study USAF supply chain stakeholder use of IS

This study will put an emphasis on the end-user and how the decentralized approach impacts him/her. It will identify how many systems are being used by program managers, item managers, and war-fighter in executing their daily tasks. This topic must be designed to provide insight into the effects of the decentralized approach on process efficiency. The researcher will investigate whether the decentralized IS management approach is making the USAF supply

chain more or less efficient. By identifying the number of IS users are required to use and how this contributes to business process effectiveness and efficiency, the research can conclude how the current IS system network is impacting the USAF supply chain workforce.

Identify operational & financial implications of decentralized IS management

This study will put an emphasis on the amount of resources being allocated to managing "local" IS. The research will quantify the number of USAF supply chain stakeholders with locally managed IS, how much it is spending on the development and management of the IS, and whether the IS is effectively meeting its intent. It will study whether the local systems are truly achieving process efficiency and realizing a return on investment. The objective of the study will be to provide insight into the cost of the decentralized IS approach.

Evaluate use of repair capabilities throughout the DoD

This study will put an emphasis on how each DoD branch manages its repair capabilities It will identify any redundant repair capabilities throughout DoD and determine the feasibility of combining the redundant efforts/resources. As a result, the research will be able to determine if the DoD's repair facilities and capabilities are being used efficiently by all of the services. This study may provide opportunities for cost reduction or increased efficiency in DoD's $30B depot maintenance program.

Conclusion

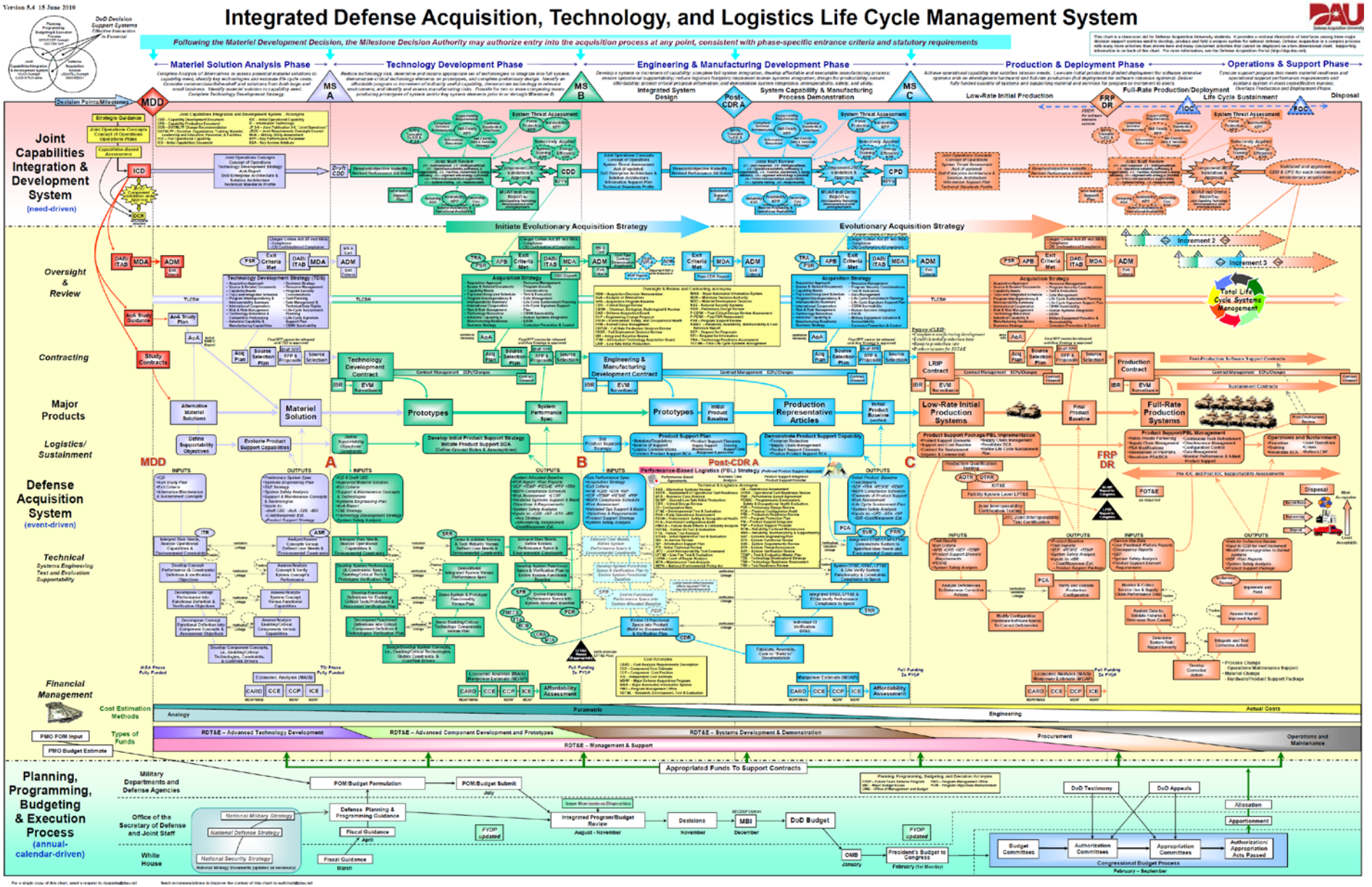
In today's technological environment, organizations rely on effective IS to be competitive its industry. Many organizations rely on an EPR system or an effective IS network to realize the benefits of available technology. However, there are organizations which have not been able to leverage available IS capabilities at an enterprise level. This report addresses how organizations can best address the deficiencies of enterprise level IS networks.

The literature review helped create a framework organizations can use to minimize the negative impacts of the enterprise-level IS deficiencies. The framework was used to evaluate USAF DSOR team and found five key managerial implications which will make its IS more effective and efficient. The framework developed in this report can be used to improve the IS effectiveness of any organization challenged with enterprise-level IS deficiencies until those deficiencies are addressed.

Appendix 1: Example of Organizational and IS Strategy Set

Organizational		Information System
to increase earnings by 10% per year	< **Objectives** >	to improve speed of billing
to improve cash flow		to provide information on product failures
to maintain a high level of customer good will		to provide information on new business opportunities
to be perceived as socially responsible		to provide information which will permit the assessment of the level of organizational objectives
to produce high quality, safe products		to provide timely and accurate information on recent performance
to eliminate vulnerability to the business cycle		to produce reports desired by regulatory agencies
		to produce information which will permit quick response to customer inquiries
diversification into new businesses	< **Strategies** >	Design on modular basis
improvements in credit practices		modular design must produce viable system at each stage of completion
product redesign		system must be oriented to differential usage by various classes of managers
		system should be responsive to the perceived need of its user-managers
		system should have real time inquiry capability
highly sophisticated management	< **Attributes Constraints** >	Availability of funds for development may be reduced
poor recent performance has fostered a recognition of the need for change		system must incorporate best available decision models and management techniques
most managers are experienced users of computer services		System must incorporate environmental information as well as internal information
high degree of decentralization of management authority		System must provide for different reports involving various levels of aggregation
organization must be response to regulatory agencies		System must be capable of producing information other than management information

Appendix 2: DoD Acquisition System Process Map



Appendix 3: USAF Organic Depot Capability by Function

		USAF Organic Depot		
TRC #	**Description**	**Oklahoma City**	**Ogden**	**Warner Robins**
1	Weapons		X	
2	Air Munitions and Tactical Missiles		X	
3	Electrical Components	X	X	X
4	Electronic Support Equipment			X
5	Electro/Mechanical SE		X	
6	Airborne Electronics			X
7	C4I	X	X	X
8	Missile & Space Launch Vehicle Components, Launch Control and Strategic Missiles		X	
9	Hydraulics/Pneudraulics/Pneumatics	X	X	X
10	Oxy & Other Gas Generating Equip	X		
11	Life Support Systems	X	X	X
12	Nuclear components		X	
13	Propellers			
14	Shelters		X	X
15	Landing Gear		X	
16	Photographic/Reconnaissance Imaging Equipment		X	
17	Training & Simulation Equipment		X	
18	Instruments/Displays	X	X	X
19	Airframe/Aircraft Related	X	X	X
20	Engines/Engine Related	X	X	
21	Composites, Plastics, Rubber, & Metal Bonding	Moved to TRC 19		
22	Cryptologic, Signal Intelligence systems, Force Protect, and Information Warfare Product	Crypto – CPSG		
23	Software	X	X	X
24	Reclamation	AMARG		

Appendix 4: IRB Exemption Approval

DEPARTMENT OF THE AIR FORCE
AIR FORCE INSTITUTE OF TECHNOLOGY
WRIGHT-PATTERSON AIR FORCE BASE OHIO

27 October 2014

MEMORANDUM FOR DR. MATTHEW DOUGLAS

FROM: Jeffrey A. Ogden, Ph.D.
AFIT IRB Research Reviewer
2950 Hobson Way
Wright-Patterson AFB, OH 45433-7765

SUBJECT: Approval for exemption request from human experimentation requirements (32 CFR 219, DoDD 3216.2 and AFI 40-402) for the AFMC A4 Depot Source of Repair Research

1. Your request was based on the Code of Federal Regulations, title 32, part 219, section 101, paragraph (b) (2) Research activities that involve the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior unless: (i) Information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) Any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

2. Your study qualifies for this exemption because you are not collecting and reporting sensitive data, which could reasonably damage the subjects' financial standing, employability, or reputation. Further, you are not collecting and reporting any demographic data which could realistically be expected to map a given response to a specific subject.

3. This determination pertains only to the Federal, Department of Defense, and Air Force regulations that govern the use of human subjects in research. Further, if a subject's future response reasonably places them at risk of criminal or civil liability or is damaging to their financial standing, employability, or reputation, you are required to file an adverse event report with this office immediately.

10/27/2014

X Jeffrey A. Ogden
Jeffrey A. Ogden, Ph.D.
IRB Exempt Determination Official

Appendix 5: Consent to Participate in Interview

CONSENT TO PARTICIPATE IN INTERVIEW

DEPOT SOURCE OF REPAIR (DSOR) DATA MANAGEMENT RESEARCH

You have been asked to participate in a research study conducted by Capt Dipta Kazi from the School of Engineering and Management at the Air Force Institute of Technology (AFIT). The purpose of the study is to research and address inconsistencies with DSOR data in multiple information systems (IS) in use by stakeholders in the logistics supply chain The results of this study will be included in Capt Kazi's Master's thesis. You were selected as a possible participant in this study because of your knowledge with the Air Force acquisition and DSOR process. You should read the information below, and ask questions about anything you do not understand, before deciding whether or not to participate.

• This interview is voluntary. You have the right not to answer any question, and to stop the interview at any time or for any reason. I expect that the interview will take about 60 minutes.

• You will not be compensated for this interview.

• The information you tell us will be confidential.

• I would like to record notes of this interview in a word document so that I can use it for reference while proceeding with this study. I will not record this interview without your permission. If you do grant permission for this conversation to be typed, you have the right to revoke permission and/or end the interview at any time.

This project will be completed by April 2015. All interview documents will be stored in a secure work space until 1 year after that date. The documents will then be destroyed.

I understand the procedures described above. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

(Please initial)

[✓] I give permission for this interview to be recorded in a word document.

Name of Subject

Signature of Subject _____ Date _____

Signature of Investigator _____ Date _____

Please contact Capt Kazi with any questions or concerns at .

Captain Kazi, Dipta/AFIT/ENS/DSN875-3636/DK/9 Oct 2014

Appendix 6: Research Summary Provided to Interview Subjects

TALKING PAPER
ON
DEPOT SOURCE OF REPAIR (DSOR) DATA MANAGEMENT RESEARCH

- The purpose of this talking paper is to introduce an HQ Air Force Materiel Command (AFMC) A4D sponsored study being conducted by the Air Force Institute of Technology (AFIT) to *research and address inconsistencies with DSOR data* in multiple information systems (IS) in use by stakeholders in the logistics supply chain

- Issue / Research Problem Statement

-- The DSOR location for reparable Air Force parts is inconsistent among select Air Force & DoD logistics information systems

-- Information systems being studied include (1) DSOR II Sharepoint, (2) DSOR Depository, (3) Federal Logistics Information System Web Search (WebFLIS), (4) Logistics, Installations, and Mission Support – Enterprise View (LIMS-EV), (5) Enterprise Solution Supply (ES-S), (6) D043A Master Item Identification Database, (7) D035A Stock Control & Wholesale Distribution Database (more IS may be added as research progresses)

- Research Objectives

-- Identify the extent of the DSOR data inconsistencies among the various information systems

-- Quantify the impact of DSOR data inconsistencies on Air Force resources

-- Deliver actionable steps to AFMC A4D to minimize the impact of data inconsistencies

- Research Methodologies

-- Interviews with acquisition stakeholders, subject matter experts, managers, and more

-- Case study of Air Force parts (by NSN) and the IS in use by different stakeholders

-- Literature review of journal articles, Air Force Instructions, manuals, and more

- Points of Contact

-- Researcher, Capt Dipta Kazi, AFIT Masters Student, School of Logistics & Management

-- Research Advisor, Dr. Alan Johnson, AFIT Faculty, School of Logistics & Management

Appendix 7: Sample Interview Questions

Below are some sample questions that were used to guide one of the interviews with an acquisition program manager:

1. What is the next process once DSOR memo is signed and returned to your program office?
    a. Is there a working group that takes place between the program office and depot to stand up the repair capability?
    b. If there is a working group, do you have meeting minutes from previous projects?
2. What IT system(s) do you use to manage acquisition projects? Are you able to help me obtain basic viewing access?
3. Do you know who finalizes the DSOR location and inputs it into a system of record (perhaps D043A, LIME-EV, or other system)?
4. Do you work directly with anyone at the depots? If so, what is your interaction with them?
5. What are your biggest challenges in working with different stakeholders (HQ AFMC, depots, other program offices, contractors, etc)?
    a. Can these challenges be minimized with more streamline information technology?
    b. What are some best practices you've seen in managing projects that you would implement throughout the supply chain?

Appendix 8: List of NSNs Researched

Nat. Stock Number (NSN)	Part Description
F-16	
1660014733547	Concentrator (CGU-24/A)
1660014733549	Regulator (CRU-98/A)
5895014977131	Interrogator/Transponder Set
5895014419089	Beam Forming Network
011216879	Stores Control Panel
012630648	Pilot Controller Grip Assembly
1270014665918	Processor, Radar Data
010618335	Hydrive Gun System
5840015675716CY	TRANSPONDER,RADAR
4810013631952WF (XB3)	VALVE,REGULATING,FL
1650012289276	DRIVE,CONSTANT SPEE
6130015228349WF (XF3)	POWER SUPPLY ASSEMB
6220014433629WF (XF3)	LIGHT,NAVIGATIONAL,
C-130	
014522467	Control, Generator
014771973	Anti-Skid Test Set
5821014833248	Radio
1620008058495LE	TORQUE STRUT ASSEMBLY,LANDING GEAR
6610014873794LG	DISPLAY UNIT,FLIGHT INFORMATION
5841014708036CX	PROCESSOR,RADAR DATA
2840010491153OJ	LINER,COMBUSTION CHAMBER,AIRCRAFT GAS TU
6610015272395	INDICATOR, VERTICAL
1610008736424	AFTER BODY HALF BODY
1620011708325	CYLINDER AND PISTON ASSEMBLY,LANDING GEA
F-22	
5985015260321	Antenna
1560015246083	Radome
5993015237903	Generator/Amplifier
6130014869149	Power Supply
5841015279740	Processor, Radar Data
2840015614467RF	LINER,AFT EXT SW UR
1560015252952FR	DOOR,ACCESS,AIRCRAF
2915014869732FR	REGULATOR,FUEL FLOW
2840015466641RF	LINER,TURBINE COMPO
6150015489029FR	WIRING HARNESS
C-17	
2915013576590BE	FUEL CONTROL,MAIN,T
5998014076273	ELECTRONIC COMPONENTS ASSEMBLY
1680014353302	Hydraulic Mechanical Linear Actuator
1680014580365	PANEL,CONTROL,ELECTRICAL-ELECTRONIC EQUI
6680015458956	TRANSMITTER, MJP
6115015444400	GENERATOR, IDG
1680014497704	ACTUATOR, ELECTRO-ME
4310015138110	OBIGGS 1.1 COMPRESSOR
2835013590360	POWER UNIT, APU
6130015935699	CHARGER, BATTERY
5865015796300	TRANSMITTER, COUNTER
5821014764092	RT IN MARSAT

Appendix 9: Thesis Storyboard

Addressing Enterprise-Level Information System Deficiencies

Capt Dipta Kazi

Co-Advisors:

Dr. Alan W. Johnson

Lt Col Matthew A. Douglas

Introduction

The failure of the United States Air Force's (USAF) Expeditionary Combat Support System (ECSS) program has resulted in supply chain stakeholders creating independent solutions in a complex network of supply chain information systems (IS). The decentralized management of IS has led to stakeholders optimizing local missions to the detriment of enterprise level goals and effectiveness. This case study evaluates the Depot Source of Repair (DSOR) team and how it has addressed the USAF's enterprise-level IS deficiencies. A framework created from the literature review is used to evaluate the DSOR team's IS called DSOR II. The case study evaluation identified five key managerial implications which better addresses the negative impacts of USAF IS deficiencies. A more effective IS will help the DSOR team manage the USAF's $13 billion depot repair program more effectively. The framework introduced in this report can be used by organizations challenged with enterprise-level IS deficiencies.

Problem Statement

- Decentralized IS approach led to sub-organizations creating IS solutions which optimize local missions
- "Pocket optimization" results in sub-optimal IS solutions for supply chain partners
- Sub-organization's lack of strategic outlook, process knowledge and resources lead to expensive, inefficient and sub-optimal supply chain IS network

Research & Investigative Questions

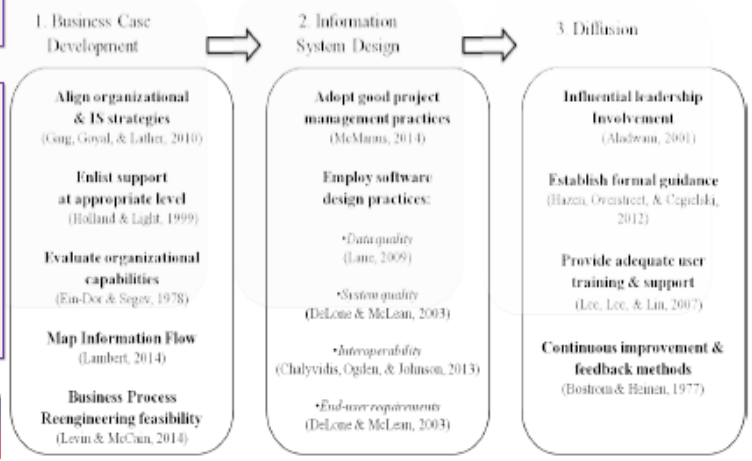
Research Question: How can organizations address negative impacts of enterprise-level Information System (IS) deficiencies?

Investigative Questions (IQ):

1. How does an organization evaluate and identify the requirements of an effective Information System (IS)?
2. How does an organization design an IS which best serves its intended function?
3. How does an organization adopt and implement an IS?

Literature Review / Framework

The literature review identified existing research and theories on IS strategy, design and diffusion. Its purpose is to offer a solution to minimizing the challenge of working in an enterprise which employs a decentralized IS approach. The findings in the literature review can be summarized in the framework presented below.



Methodology

- Single Case Study: Depot Source of Repair Team (DSOR)
- Evaluate DSOR team IS using theories & existing research developed in literature review
- Purpose: Address IS deficiencies from supply chain stakeholder perspective
- Literature review: Existing theories & research on IS strategy, design and diffusion
- Data Collection: documents, archival records, interviews, direct observation, participant observation
- Analysis: used framework to analyze case study data

Managerial Implications

1. Align organizational & IS strategies
   Focus on making DSOR II an effective tool for DSOR team
2. Address organizational capability roadblocks
   Use cross-functional team to manage DSOR II project
3. Reduce stakeholder complexity
   Incorporate all DSOR team processes into DSOR II
4. Re-engineer Business Process
   Change business process to record data by NSN
5. Achieve IS interoperability
   Set up electronic data exchange capability with D200A

Research Sponsor

Air Force Materiel Command (AFMC)
Wright Patterson AFB, Ohio

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REPORT DOCUMENTATION PAGE		*Form Approved* *OMB No. 0704–0188*

1. REPORT DATE (DD–MM–YYYY)	2. REPORT TYPE	3. DATES COVERED *(From — To)*
26-03-2015	Master's Thesis	September 2013 – March 2015

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Addressing Enterprise-Level Information System Deficiencies	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)	5d. PROJECT NUMBER
Kazi, Dipta Captain, USAF	5e. TASK NUMBER
	5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)	8. PERFORMING ORGANIZATION REPORT NUMBER
Air Force Institute of Technology Graduate School of Engineering and Management (AFIT/EN) 2950 Hobson Way WPAFB OH 45433-7765	AFIT-ENS-MS-15-M-111

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
Air Force Materiel Command (AFMC) Mr. James Marsh, GS-13 4375 Childlaw Rd Wright Patterson AFB, OH 45433 james.marsh.3@us.af.mil	AFMC/A4P
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT
Distribution Statement A. Approved for Public Release; Distribution Unlimited

13. SUPPLEMENTARY NOTES
This work is declared a work of the U.S. Government and is not subject to copyright protection in the United States.

14. ABSTRACT

The failure of the United States Air Force's (USAF) Expeditionary Combat Support System (ECSS) program has resulted in supply chain stakeholders creating independent solutions in a complex network of supply chain information systems (IS). The decentralized management of IS has led to stakeholders optimizing local missions to the detriment of enterprise level goals and effectiveness. This case study evaluates the Depot Source of Repair (DSOR) team and how it has addressed the USAF's enterprise-level IS deficiencies. A framework created from the literature review is used to evaluate the DSOR team's IS called DSOR II. The case study evaluation identified five key managerial implications which better addresses the negative impacts of USAF IS deficiencies. A more effective IS will help the DSOR team manage the USAF's $13 billion depot repair program more effectively. The framework introduced in this report can be used by organizations challenged with enterprise-level IS deficiencies.

15. SUBJECT TERMS
Information System (IS), Information Technology (IT), Depot Source of Repair (DSOR), deficiencies, acquisition

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE	UU	99	Dr. Alan W. Johnson
U	U	U			19b. TELEPHONE NUMBER (Include Area Code) (937)255–3636 x4703 alan.johnson@afit.edu